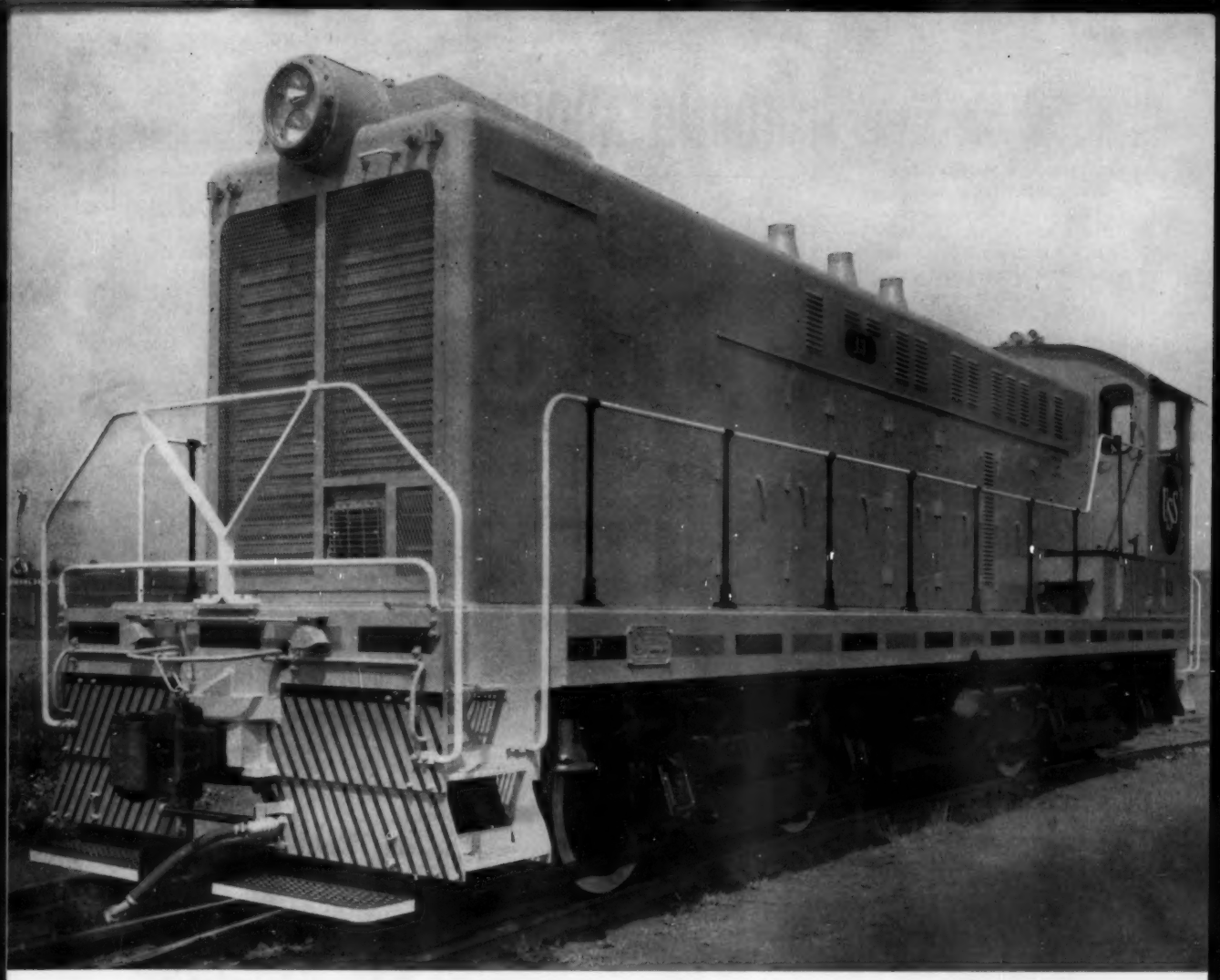

Columbia-Geneva Steel reports trouble-free, time-saving service from 10 Baldwin Diesels since 1947

Efficient, dependable locomotives are indispensable to a steel mill. For example, it costs hundreds of dollars for every minute's delay in getting a heat out and ingots to the blooming mills and soaking pits.

Baldwin Diesel Locomotives have been giving trouble-free, time-saving service since 1947 at Columbia-Geneva Steel Division of United States Steel Corporation, Geneva, Utah. After five years of reliable performance, Columbia-Geneva's Baldwin Diesels were supplemented by the above model S-8, 6 cylinder, 800 hp locomotive for general transfer service.

Baldwin Diesel Locomotives are serving U. S. Steel in many other locations . . . from the Mesabi to Orinoco in ore handling service . . . to the new Fairless Works in general transfer service. At the left is a new 35 ton Baldwin Diesel-Hydraulic Industrial Locomotive which went into service at the Fairless Works in April, 1953. Baldwin's modern 25 to 80 ton Diesel-Hydraulics are cutting operating and maintenance costs substantially in blast furnace and steel plant service.

Write now for our new Bulletins 2006 and 2007 on Baldwin-Industrial Locomotives. Address Department 1560, Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pa.

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Industrial Locomotives

BALDWIN-LIMA-HAMILTON

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Report on Western Conference

MANY PLANT ENGINEERS from the West Coast and such points as Texas, Arizona and Colorado gathered recently at the Ambassador Hotel, Los Angeles, to take part in the Second Western Plant Maintenance and Engineering Conference.

The opening remarks by L. C. Morrow, general chairman, at Tuesday's general session was the official beginning of the conference.

General session on Tuesday covered talks by W. E. Fore, assistant plant engineer, North American Aviation, Inc., Los Angeles, Calif.; and C. A. Gallaher, plant engineer, Aeronautical Div., Robertshaw-Fulton Controls Co., Anaheim, Calif., on the subject of operating with a large or small maintenance force.

J. Atkinson, plant engineer, Du Pont, left, and M. Eversz, plant engineer, McCulloch Motors Corp., conducted the conference on methods of lubrication

Afternoon sessions covered such subjects as preventive maintenance, lubrication methods, maintenance training, and how to make budgets and control maintenance costs.

On Wednesday, the general session discussed the subject, Maintenance Planning and Scheduling for Efficient Operation. The sectional conferences in the afternoon handled such subjects as: Preventing and Counteracting Corrosion, Handling New Construction and maintaining buildings. Handling New Projects on Time and at the Right Cost; and Maintaining Electrical Equipment.

A number of plant engineers from the Los Angeles Plant Engineers' Society took part as either chairmen or speakers at many of the sesions mentioned above. Among them were: W. E. Fore, assistant plant engineer, North American Aviation, Inc., Los Angeles, Calif.; H. M. Eversz, plant engineer, McCulloch Motors Corp., Los Angeles Calif.; George A. Evans, mechanical engineer, Axelson Manufacturing Co., Los Angeles, Calif.

J. T. Snedden, chief plant engineer, Norris-Thermador Corp., Los Angeles, Calif.; James M. Weeks, plant engineer, Plomb Tool Co., Los Angeles, Calif.; F. C. Rogers, plant engineer, A. O. Smith Co., Los Angeles, Calif.; and R. E. Wills, plant engineer, Pabst Brewing Co., Los Angeles, Calif.

A member of the San Francisco Plant Engineers' Society also took part in the conference. James Atkinson, plant engineer, E. I. du Pont de Nemours & Co., Inc., South San Francisco, California, was the discussion leader for the sectional conference on lubrication methods.

School Bells Ring Again

An Industrial Plant Maintenance Institute will be held December 5, 6 and 7, at the University of Wisconsin, for the benefit of plant engineers, plant managers and maintenance supervisors.

Program plans include sessions on planning and scheduling, preventive maintenance, application of industrial engineering to maintenance activities, training of maintenance workers, and selling management on an effective maintenance program.

The Plant Maintenance Institute will be one of 15 sponsored by the Engineering Institutes of the University of Wisconsin Extension Division. Among the others will be: Diesel Engine Operators, Sept. 15-16; Materials Handling and Packaging, Sept. 27-29; Technical Expression, Oct 5-7; Industrial Motor Control, Oct. 13-14; Air Conditioning, Nov. 7-9; Heat Treating, Dec. 8-9.

Information concerning fees and housing for the Plant Maintenance Institute, or any of the others, can be obtained by writing Engineering Institutes, University of Wisconsin Extension Division, Madison 6, Wis.

September Events

MANY INTERESTING exhibits will be displayed at the Metalworking Machinery and Equipment Exposition, to be held at the Coliseum, Chicago, Illinois, from September 6 to 17.

On September 10, 11 and 12, the Instrument Society of America will present its 1955 Maintenance Clinic in Los Angeles, California. Twenty-four subjects will be covered. This program is directed to men charged with the respon-

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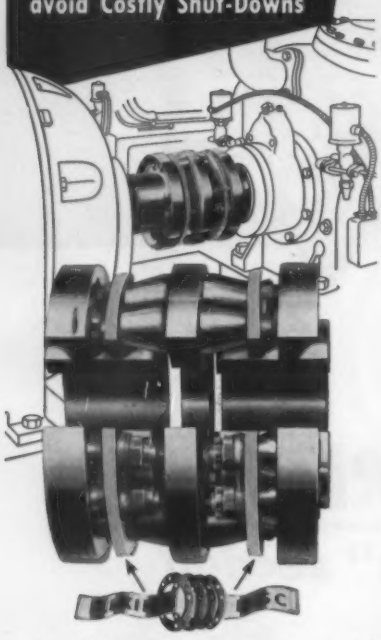
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs



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NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
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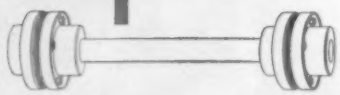
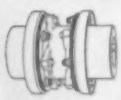
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.





Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

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'ROUND ABOUT

sibility of maintaining industrial process and test control equipment. The Clinic will be held in Founder Hall of the University of Southern California, Los Angeles.

The Seventh Annual Industrial Engineering Conference, will be held at Michigan State University, East Lansing, Michigan from September 12 to 16. Subjects for the discussion groups will consist of: Beginning and Advanced Motion and Time Study; Plant Layout and Materials Handling; and Industrial Engineering for Small Plants.

Exhibits of equipment, awards in packaging and handling and a short course will all be part of the Industrial Packaging and Materials Handling Show. It will be held at the Kingsbridge Armory, New York City, from September 20 to 22.

The American Hot Dip Galvanizers Association, Inc., will hold its 1955 Semi-Annual meeting on Thursday and Friday, September 29 and 30, at the Sheraton-Belvedere Hotel, Baltimore, Maryland. The two-day conference will include the Problems Clinic Session. The speakers' session will feature the motion picture film "Automation As Applied to Centrifugal Galvanizing" as well as talks on "Observations of European Galvanizing Techniques" and "Abrasive Blasting Techniques and Advances."

GE Unveils Ceramics-Metals Lab

Discussing new laboratory building recently dedicated by General Electric Company at its Research Laboratory near Schenectady, Dr. H. Herbert Hollomon, Manager of the Metallurgy and Ceramics Research Department, describes scale model to H.E.B. Anderson, Plant Engineering editor who attended press preview of lab facilities

New Plants

Leeds & Northrup Company's new $3,000,000 instrument manufacturing plant near North Wales, Pa., is two-thirds complete, with steel framework erected and half the roof in place. Contractor is the Baton Construction Corp. of Philadelphia . . . **Hercules Powder Company** plans to start immediate construction of a new plant for the production of pentaerythritol, representing a total investment of approximately $6 million. Located in the Midwest, on the site of an existing Hercules anhydrous ammonia plant at Louisiana, Missouri, the plant will have an annual production of 24 million pounds of pentaerythritol and 100 million pounds of formaldehyde . . . Representing its fourth expansion in the past nine years, **New Hampshire Ball Bearings, Inc.,** announced plans for the construction of a new 40,000 sq ft plant for bearing manufacture. The new plant will be erected on a 27 acre site south of the business section of Peterborough, N. H., at an estimated cost of $350,000.

Financing Plant Equipment

INSTALMENT MACHINERY financing with payments geared to depreciation schedules will be just one of the many features planned during the Production Engineering Show in Chicago, September 6 to 16. This event, at Navy Pier, is being held in conjunction with the National Machine Tool Show at the International Amphitheater.

The pay-as-you-depreciate plan of financing, developed by the C. I. T. Corporation, features terms of up to 10 years with payments geared to the sum-of-the-digits method of depreciation allowed by the new tax law.

Material Handling Institute Looks Back on Ten Years

THIS MAKES it No. 10 for the Material Handling Institute, Inc. In looking back on ten years of service to the public, the Institute proudly points to a number of accomplishments.

Some of the educational accomplishments attained by the Material Handling Institute during the past ten years include:

1. The organization of users into chapters in industrial centers.
2. The Material Handling Institute Traveling Clinic is an important educational contribution for users. These are panel-type programs on various material handling subjects.
3. The Institute's educational committee is publishing a series of booklets named the Material Handling Library of Know-How.
4. Sponsorship of the College-Industry Committee on Material Handling Education whose membership includes eight professors from leading engineering colleges, four manufacturer executives and four user executives.
5. Sponsors and manages a national exhibition devoted exclusively to material handling equipment. The current one is known as: The Material Handling Institute's Exposition of 1956 and it will be held June 5 through June 8, 1956, at Cleveland's Public Auditorium and Exhibit Halls.

Further information about the Material Handling Institute can be obtained by writing to its national office, 1 Gateway Center, Room 759, Pittsburgh 22, Pennsylvania.

IT'S LYON 5 TO 1

● *The votes of key men in companies throughout the country speak volumes for Lyon. For these men gave Lyon five times more first choice votes than the second highest manufacturer! And twice as many as the next twelve combined!*

A nationally known research company compiled these figures when they asked key men in 5,000 companies this question:

"If your company were in the market for steel equipment such as steel shelving, lockers, work benches, shop boxes, etc., what manufacturers would you consider?"

Your nearest Lyon Dealer offers the world's *most diversified* and *most preferred* line of quality steel equipment. (A few are shown below.) Equally important, he can show you how to get the most out of steel equipment in terms of time, space and money.

LYON METAL PRODUCTS, INC.

General Offices: 991 Monroe Ave., Aurora, Ill.
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Dealers and Branches in All Principal Cities

Lyon also has complete facilities for manufacturing special items to your specifications.

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STEEL EQUIPMENT

for BUSINESS • INDUSTRY • INSTITUTIONS
also STEEL KITCHENS for THE HOME

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- Shelving
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- Bin Units
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- Cabinet Benches
- Storage Cabinets
- Drawing Tables
- Tool Toters
- Bar Racks
- Tool Boxes
- Parts Cases
- New Freedom Kitchens
- Display Equipment
- Toolroom Equipment
- Wood Working Benches
- Flat Drawer Files
- Revolving Bins
- Filing Cabinets
- Hanging Cabinets
- Folding Chairs
- Coat Racks
- Work Benches
- Bench Drawers
- Service Carts
- Sorting Files
- Drawer Units
- Hopper Bins
- Tool Stands
- Shop Boxes
- Tool Trays
- Shop Desks

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NEW! HORIZONTAL contour TRANSPORTATION

ANOTHER OTIS FIRST! The Otis TRAV-O-LATOR is a modification of the world famous reversible Otis Escalator—another Otis first that was designed to move people, ***not materials!*** It's as easy to ride as an escalator. Its moving surface is an endless platform of metal escalator treads. It is smooth gliding for safe riding; cleated for safe traction; comb toothed for safe interlocking between treads and for safe stepping from moving treads to comb plates at entrance and exit points. In addition, it has the Otis escalator balustrades and handrails. All, long proven safety features.

There's practically no limit to the length, flexibility, or use of the TRAV-O-LATOR. Ask any of our 295 offices across the United States and Canada for details.

OTIS ELEVATOR COMPANY, 260 11th Avenue, New York 1, N. Y.

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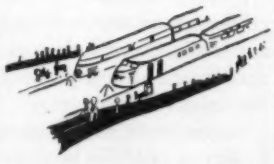

RAILROAD STATIONS

SPORT STADIUMS

SCHOOLS

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"AUTOMATION" GIVES AUTO AS CORRECT

It was the fabulous automobile industry that popularized mass production a generation ago. Now, through the miracle of "Automation," this same industry is combining mass production with *mass precision* to produce better cars—for more people—than ever before possible.

Today, in leading plants, rough metal forgings and castings enter one battery of machines, are routed by automatic transfer devices to succeeding batteries of machines, and finally emerge as finished engine blocks, crankshafts, pistons, etc.

In one plant, for example, rough engine blocks pass at the rate of 100 an hour through 637 different machines and transfers, and come out—after some 1,000 separate machining and testing operations—finished to within tolerances of one ten-thousandth of an inch.

SOCONY MOBIL

Correct Lubrication

FIRST STEP IN CUTTING COSTS

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MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION
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INDUSTRY DRAMATIC BOOST BOTH IN QUALITY AND QUANTITY, LUBRICATION PLAYS EVER MORE VITAL ROLE

What Automation Is . . . This linking together of machines and transfer devices to obtain high precision finish of mass-produced parts is called *"Automation."* The many devices used to achieve this marvel of mass precision stagger the imagination. Electronic, pneumatic and hydraulic equipment controls the transfer of parts from one operation to another, positions each part for

accurate machining, indicates when to change cutting tools, measures and sorts parts, pin-points trouble instantly should it develop. Even testing is done electronically, with parts automatically inspected at frequent intervals and ejected from the line if out of tolerance.

Correct Lubrication Vital . . . In all this maze of complex machinery there is one common factor of ever increasing importance. This is *Correct Lubrication.* For in Automation—more than in any other manufacturing process—continuous, trouble-free operation and immediate response of every moving machine part spell the difference between success and failure. Should a single

part of a single machine fail, it can bring an entire battery of machines to a standstill.

This is why so many leaders in Automation have entrusted their multi-million dollar plants to Socony Mobil—world leader in lubrication. In these plants, Socony Mobil engineers work continually with operators and machine builders through a program of Correct Lubrication to help keep production flowing smoothly—hold maintenance costs to a minimum.

Whatever *your* manufacturing process—whatever you make—you can get a similar program of Correct Lubrication started in your plant to help improve your production—cut your costs. Just call Socony Mobil.

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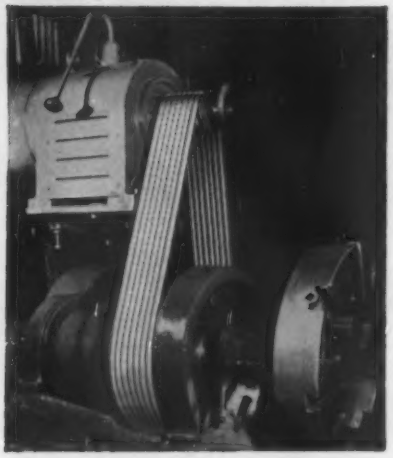
This large lathe was formerly driven by a flat belt which slipped on heavy cuts, stalled and broke tool bits. Savings on broken tool bits alone offset the cost of the drive the first year—and production was increased 25% after the V-belt drive was installed.



concave sides lengthen V-belt life ...cut costs

Hundreds of plants that keep track of V-belt drive costs know this: Gates Vulco Ropes . . . the V-belts with *concave sides*...wear much longer and *cost less per year of service.*

Here is the interesting reason why:

When a Gates V-belt bends around the sheave, the *precisely-engineered* concave sides (Fig. 1) fill out and become straight. Thus the sides of the belt make full, uniform contact with the pulley (Fig 1-A).

Naturally, uniform contact distributes the wear *evenly*. And *even* wear means *longer* wear.

Longer wear saves not only on replacement costs; it also saves the cost of down-time... keeps equipment producing.

Simple test proves value of concave sides

Take a straight-sided V-belt (Fig. 2) and bend it. Feel the sidewalls of the belt bulge out as the belt bends. You see immediately that the bulging sides prevent uniform contact with the pulley (Fig. 2-A). Uneven contact causes faster wear...increases your drive replacement costs.

Let the cost-saving longer life of Gates Vulco Ropes contribute to *your* profits. Specify Gates Vulco Ropes—the V-belts with concave sides (U.S. Patent 1813698). The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-belts.*

Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

99A-54A

GATES VULCO ROPE DRIVES

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✓ Industry wipes out corrosion with Firestone Exon Resins

Corrosion-free ducts are no pipe dream!

At G.E., Quelcor* PVC Coating keeps flues, hoods, blowers free from damage by strong acids!

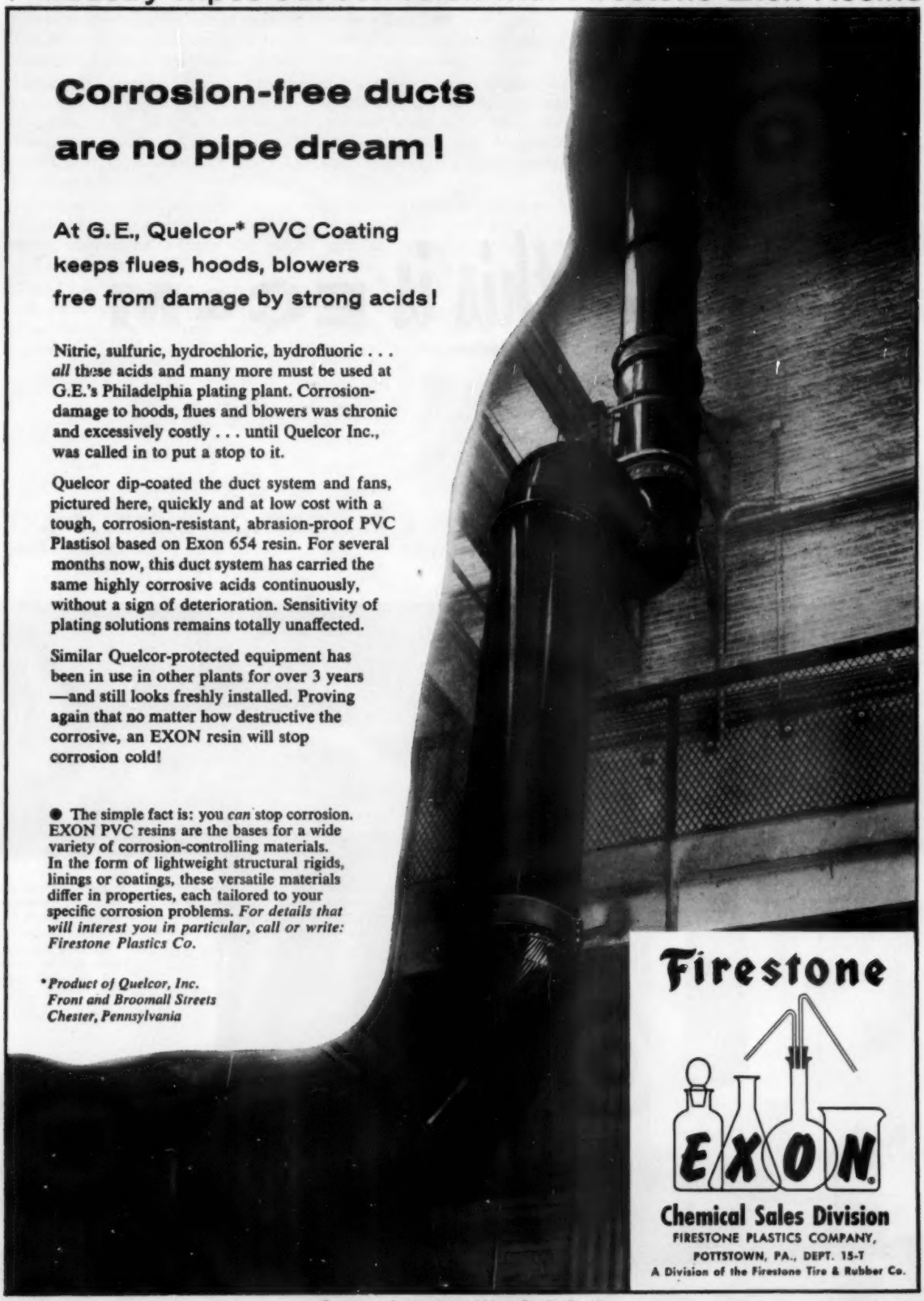
Nitric, sulfuric, hydrochloric, hydrofluoric . . . *all* these acids and many more must be used at G.E.'s Philadelphia plating plant. Corrosion-damage to hoods, flues and blowers was chronic and excessively costly . . . until Quelcor Inc., was called in to put a stop to it.

Quelcor dip-coated the duct system and fans, pictured here, quickly and at low cost with a tough, corrosion-resistant, abrasion-proof PVC Plastisol based on Exon 654 resin. For several months now, this duct system has carried the same highly corrosive acids continuously, without a sign of deterioration. Sensitivity of plating solutions remains totally unaffected.

Similar Quelcor-protected equipment has been in use in other plants for over 3 years —and still looks freshly installed. Proving again that no matter how destructive the corrosive, an EXON resin will stop corrosion cold!

● The simple fact is: you *can* stop corrosion. EXON PVC resins are the bases for a wide variety of corrosion-controlling materials. In the form of lightweight structural rigids, linings or coatings, these versatile materials differ in properties, each tailored to your specific corrosion problems. *For details that will interest you in particular, call or write: Firestone Plastics Co.*

**Product of Quelcor, Inc.*
Front and Broomall Streets
Chester, Pennsylvania



Firestone

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Chemical Sales Division
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A Division of the Firestone Tire & Rubber Co.

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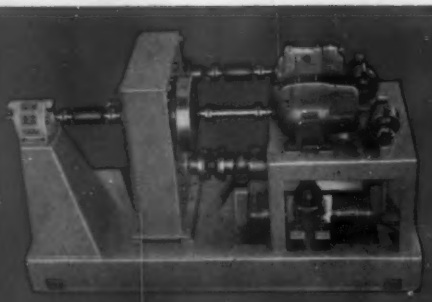
this is EC&M

For maximum "teamwork", the drafting and engineering departments are located side by side at EC&M.



The Test Tower, which dominates the EC&M roof line, houses the above hoisting unit equipped with a d-c and an a-c motor used to test and develop hoist-control applications.

Assembly line production of Oil-Break Starters for hazardous locations. Each starter has its own oil disconnect switch.

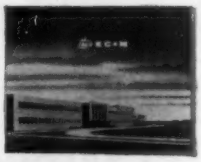
New manufacturing plant and offices in Cleveland now provide **EC&M** with the most modern facilities for the production of motor control apparatus, automatic motor starters, and lifting magnets.

These facilities include new production machines, an enclosed test-tower for developing hoist-control circuits, and an improved flow of materials . . . all devoted to the efficient building of Magnetic Controllers, Brakes, Limit Stops, Resistors, Starters and Magnets. Production is backed by a closely knit engineering and manufacturing team.

Shown on the right are a few of the well-known **EC&M** products and the photographs directly below highlight some of the new manufacturing operations which will assure you of better service from all **EC&M** equipment.

EC&M has already earned a reputation for quality and engineered-to-order equipment. Now this reputation is magnified by a PLUS value by means of these enlarged facilities for developing, testing, engineering, manufacturing and shipping . . . all under one roof.

Write for your copy of the new EC&M Plant Booklet No. 6185



THE ELECTRIC CONTROLLER & MFG. CO.

4498 Lee Road • **Cleveland 28, Ohio**

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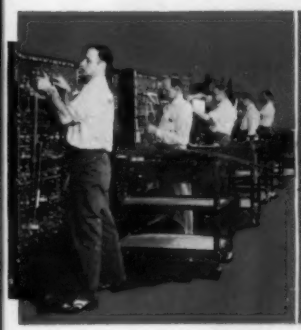
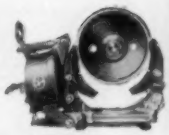


Magnetic Controller department where control circuit wiring and tinned-copper bus-bars are added to conform to engineered wiring diagrams.

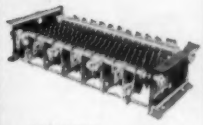
65-inch diam. magnet-coil on motor-operated winding machine with strap copper being wound under electrically-controlled tension.

Completely modern, fully equipped magnet line for producing new magnets . . . renewing used magnets.

YOUNGSTOWN SAFETY LIMIT STOP
Bulletin 1032.



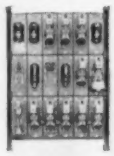
LONG-LIFE WB BRAKES for A-c and D-c Cranes.
Bulletin 1004.



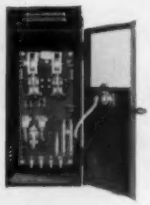
TAB-WELD Plate Resistors
Bulletin 942.

CAM MASTER SWITCHES . . .
Bulletin 1190.

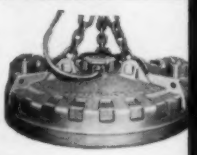
DISCONNECT SWITCHES.
Bulletin 1023.



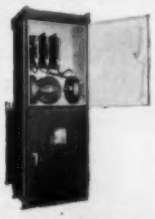
MAGNETIC CONTROLLERS.
Bulletins 921-930.



AUTOMATIC-DISCHARGE MAGNET CONTROLLERS.
Bulletin 905.



ALL-WELDED MAGNETS
Bulletin 900.



Oil-Break 2200-5000 volt Motor Starters.
Bulletin 1062.

Air-Break 2200-5000 volt Motor Starters.
Bulletin 1060.

CARING FOR WAXED FLOORS IS . . .

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Sanax was developed to permit frequent cleaning of waxed floors *without washing away the finish* . . . and to eliminate waste in wax and labor. A neutral liquid soap with a wax base, *Sanax* not only quickly removes dirt, oil, and grease, but *leaves a thin film of wax.* In fact, regular use of *Sanax* to machine-scrub or damp-mop waxed floors *actually prolongs the life of the finish,* and thereby reduces refinishing costs on a year-to-year basis.

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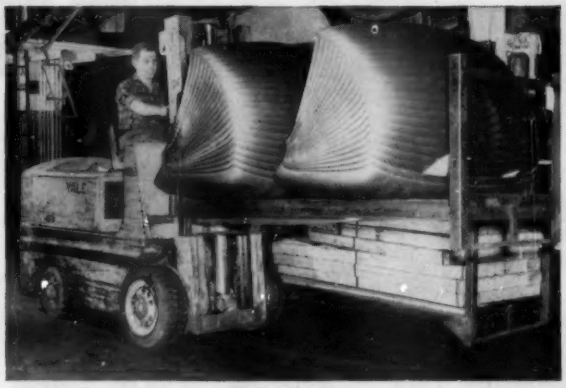
B.F.Goodrich

Industrial tires wear longer, resist cuts better, automotive stampings company reports

Crane lifts a giant steel bar in the factory yard.



Tires roll on oily floors to carry deck lids out of the Press Shop.

Finished cowl panels are delivered to Shipping Dept.

Scrap material that can injure tires is stored in Wood Mill.

THESE photographs were taken at the Detroit, Michigan, factory of one of the country's leading manufacturers of automotive stampings. Here over 200 materials handling units work in the yard or on floors often covered with tire-killing iron and steel scrap and oil. Premature tire failure could be common. But it's not, thanks to B. F. Goodrich industrial tires.

B. F. Goodrich industrial tires are hard to beat, the supervisor of truck repairs reports. They wear longer and resist cuts better than other tires. That's because the B. F. Goodrich Tire and Wheel Analysis man matched the tires to the job.

You can have a FREE TW Analysis, too

The B. F. Goodrich Tire and Wheel Analysis man will study your equipment, loads, hauling surfaces and any special problems you have. Then he'll recommend the right industrial tires for you to use — the right type, size, tread compound and tread design. You can save as much as 50% from this service, as much as 20% from the maintenance tips he gives. His services are FREE and unbiased, because B. F. Goodrich makes a *complete* line of industrial tires.

Mail the coupon today. Consulting engineering service is available to manufacturers of materials handling equipment.

Specify B. F. Goodrich tires when ordering new equipment

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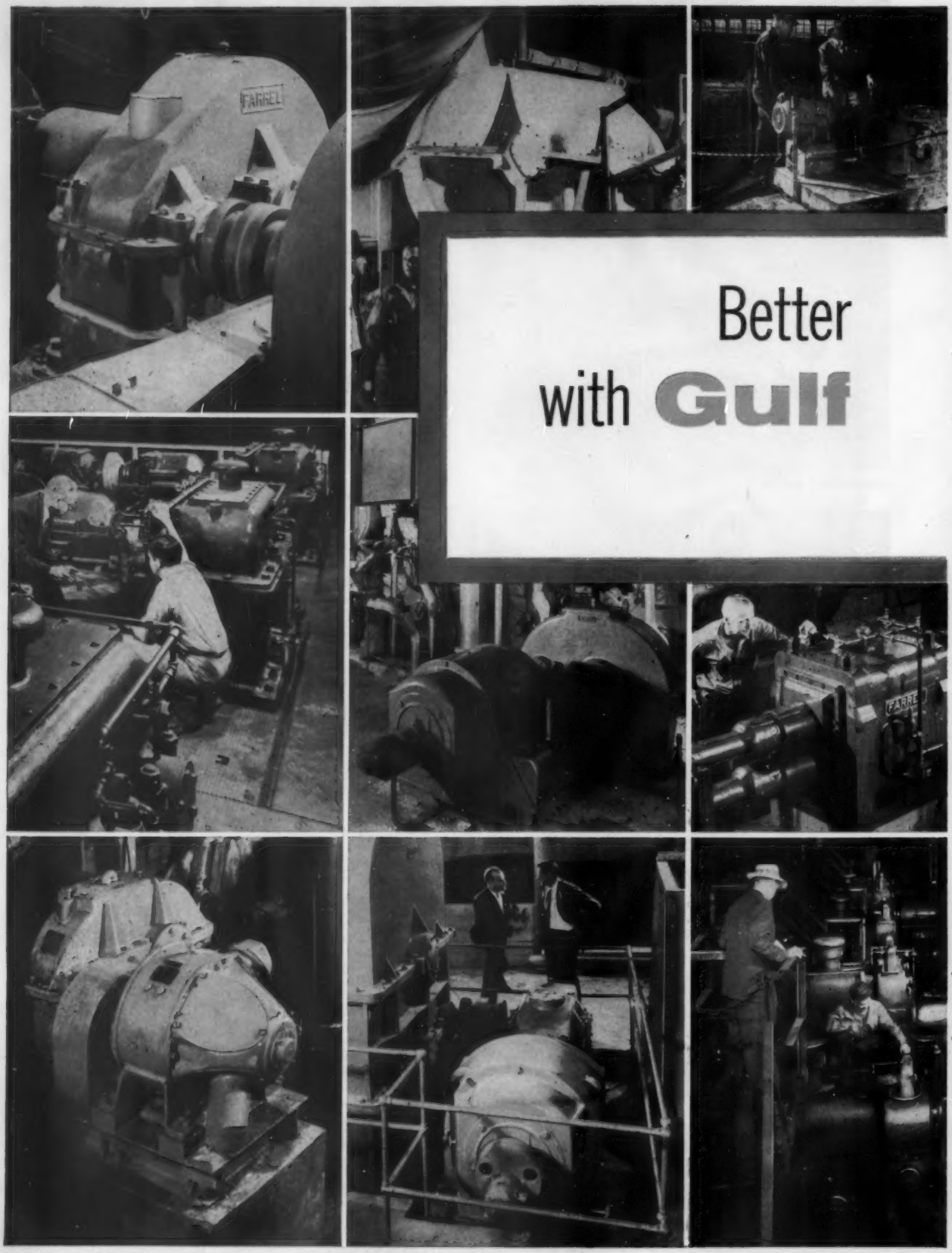
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Gulf E.P. Lubricants combine all the properties that count in an extreme pressure lubricant: high film strength, excellent rust preventive properties, good water separating characteristics, exceptional stability, and they are non-corrosive, non-foaming. Their use assures lower maintenance costs for gear drives over a wide range of operating conditions.

In addition, their superior film strength enables a lower viscosity grade to be used than would be possible with a straight mineral oil. The use of one grade of Gulf E.P. Lubricants will often enable you to eliminate several grades of straight mineral oil, thus simplifying your lubricant storage and handling.

Their superior film strength also insures gear teeth against lubricant failure due to shock loads and overloads.

Gulf E.P. Lubricants are available in the proper viscosity for every gear requirement, ranging from 55 to 1000 SUV at 210°F. Call in a Gulf Sales Engineer today and have him make specific recommendations for your equipment.

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Lasting low cost installation. FILON translucent panels nest with corrugated metal or asbestos. Easily installed, no costly framing.

Better skylights and sidelights. FILON transmits soft, diffused light. Assures greater comfort and employee efficiency.

Shatterproof windows. Flat FILON panels filter out harsh sun rays. Choice of colors for varying degrees of light transmission.

Strong and weather resistant. Fiberglas and Nylon reinforced, FILON is extremely strong, gives all weather protection. Ideal for loading dock roofs

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BULLETINS just released and of immediate plant interest

MAINTENANCE

101 Coating Properties—This 19-pp report, "Comparative Properties of Protective Coatings," contains information on 14 types for protecting equipment, walls, beams, and ceilings in plants where fumes and industrial atmospheres cause corrosion. Includes physical and chemical data and a section on selection. A chart shows comparative value of various coatings as protection against weather, impact, abrasion, and other destructive agents. The Atlas Mineral Products Co.

102 Maintenance Directory—Bulletin 1062 serves as a directory of products for plant upkeep and repair requirements. For wall or desk, it lists, alphabetically, common maintenance problems nad suggests solutions. Among maintenance jobs listed are those requiring acid-resistant coatings, anti-rust paints, dampproofing. The Monroe Co., Inc.

103 On Concrete Floors—This 12-pp booklet describes the basic concrete floor, and illustrates some of the common faults due generally to improper construction and maintenance. The terms "dusting" and "blooming" are explained and means for overcoming these problems are indicated. Cleaning, finishing, and daily maintenance tips for concrete floorings are covered. National Sanitary Supply Association.

104 How Zinc Controls Corrosion—Ways in which zinc lengthens the life of steel products, and reduces maintenance costs are detailed in this 32-pp illustrated bulletin. Drawings, charts, and photos together with brief comments present corrosion control characteristics of zinc coatings, zinc pigments, and zinc anodes. An extensive selection of industrial and other applications is reviewed. American Zinc Institute.

105 Maintenance Specialties—An industrial sanitation handbook, this 32-pp general catalog lists many new chemical specialties for industrial maintenance as well as standard sanitation and floor finishing items. Covers hand soaps, floor waxes, floor finishing products, floor cleaning products and floor machines, germicides and deodorants, industrial lubricants, insecticides. Fully illustrated, this booklet gives data on performance, suggested uses, coverage, packaging. Huntington Laboratories, Inc.

106 For Lining Vessels — Bulletin 1012 gives details on a formula for lining steel vessels on the job and greatly extending their service life. Tells how to prepare and apply this inexpensive lining, includes data on coverage. Pocono Fabricators, Inc., Div., The Patterson-Kelley Co., Inc.

107 Multipurpose Sweepers—How one multipurpose model sweeper equals 15 to 38 men with brooms is told in Form S 102. Describes and pictures construction and operational features of the machine, includes specifications. Wilshire Power Sweeper Co.

108 Industrial Vacuum Cleaner—Advantages of using company's floor-type vacuum for industrial cleaning jobs are stressed in this illustrated bulletin. Describes operation, points out typical applications, and includes dimensions and specifications. Handling Devices Co., Inc.

VENTILATING, DUST AND FUME CONTROL

109 Wet Dust Collector—Plant engineers faced with the problem of control of hot or moist, explosive or combustible, corrosive, abrasive or obnoxious dusts will be interested in Bulletin 919 describing company's type CW-1 centrifugal wet dust collector. Photos, line drawings and tables give complete data on counter current, wet collector of tower construction. Pangborn Corp.

110 On Dust Collection—Specifications and descriptive details about company's Hydro-Filter are contained in 12-pp Bulletin 55. Tells how unit uses filtering principle to trap dust by impingement on glass spheres; entrapment on bubble surfaces and containment within water droplets. Separating efficiencies, application data, construction and design as well as a description of models and capacity range available and description of laboratory facilities are included. National Dust Collector Corp.

111 General Purpose Fans—Bulletin 545, 12-pp, describes company's line of general purpose fans, portable self-contained units of medium capacities for ventilating and industrial applications. Gives data on fans with forward curved wheels, fans with improved power limiting wheel, and includes dimensions, capacity tables. The New York Blower Co.

112 Protection from Smog—This 6-pp booklet recommends a well engineered air distribution system, adequate removal of coarse particles and fine aerosol mists, and activated carbon filtration to eliminate gaseous and vaporous impurities from intake air, to safeguard against hazards and irritations of smog. Connor Engineering Corp.

ELECTRICAL EQUIPMENT

113 For Service Entrances—Sixteen-pp Bulletin GEA-6286 describes company's line of fusible service entrance equipment. Explains features of seven basic types of fusible service entrance devices for commercial and light industrial applications. Describes accessories such as interchangeable raintight box hubs, and contains information on merchandising aids available for the use of electrical contractors. In addition, gives ratings, wiring diagrams, dimensions, ordering data. General Electric Co.

114 Power Distribution Cables—The advantages of company's Powerduct cables for flexible bus-drop power distribution are outlined in this illustrated bulletin. Includes tabular data on Duracord and Densheath type cables, as well as directions for normal installation with overhead bus-duct. Anaconda Wire & Cable Co.

115 Transformer Connections—Eight-pp Bulletin CS-102 features company's transformer power and lighting connections, including diagrams and explanations of operation, as well as common single phase applications. Schematic diagrams illustrate installations. Kuhlman Electric Co.

116 Motor Control—Bulletin EC-80, 42-pp is designed to help in selecting electrical components for air conditioning, heating, ventilating, pump, and compressor equipment. Profusely illustrated, bulletin covers all major fields, and gives a wealth of motor control data in form of tables, charts and diagrams. Cutler-Hammer, Inc.

117 For Better Plating—Twelve-pp Catalog 127, "A Guide to Better Plating Power," presents a complete line of selenium rectifiers. Illustrates and describes basic and custom designed units with d-c output ratings from 0.5 to 50,000 amp, in air-cooled or sealed water or oil-cooled models. Although prepared for the electroplating industry, this booklet is of interest wherever d-c power conversion equipment is utilized. Bart-Messing Corp.

118 On Protective Devices — Bulletin 555 summarizes importance of electrical maintenance and describes testing equipment for assuring proper performance of current actuated protective devices. Describes types of units currently available for preventing equipment failure or outages by preliminary and running safety checks. A recommended procedure of improving maintenance practice through a test record system given. The Multi-Amp Corp.

COMMUNICATION

119 Annuciator Systems—Thirty-pp Catalog 100-A, contains information on company's improved Panalarm '50' annuciator systems. All components in a modern annunciator system, together with improvements in mechanical and electrical design, are described. Charts, engineering data and National Electric Code Requirements are listed to help in selection of proper annunciator for specific application. Catalog is profusely illustrated. Panalarm Products, Inc., Div. of Panellit, Inc.

120 Sound Goes to Work—Key functions of industrial sound systems are described in this 12-pp booklet. Applications of sound and typical equipments are briefly discussed and illustrated. Written in non-technical language, booklet tells how sound can be used to simplify plant administration, coordinate production, improve employee morale, provide effective voice control of all plant functions, and save manpower. Engineering Products Div., Radio Corp. of America.

INSTRUMENTS, CONTROLS

121 Automatic Controls — Bulletin S-730 features company's line of pressure, hydraulic, temperature, process and combustion controls. Photos of 27 items in the line of automatic valves, regulators, controllers, hydraulic valves, refrigeration back pressure valves and complete systems for process and combustion control are included, as well as a description of recommended applications, construction and operation features. A. W. Cash Co.

122 Control Components—Stepping switches, relays and key switches for industrial use are described briefly and pictured in Circular 1843. Descriptive matter covers their functions, specifications. Automatic Electric Sales Corp.

123 Sequencing Timing Control — Data Sheet 11.12-1 describes two systems for obtaining sequence timing control, used in water treatment plants, chemical and food processing plants, and paper and textile mills to pace chemical feeders and other equipment. Presents a method for operating processing equipment in accordance with specified increments of total flow or weight measurements. Industrial Div., Minneapolis-Honeywell Regulator Co.

On pages 215-216 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

124 Flow Measurement In Sewage Works—Bulletin Ref. B-I-F- M39, 20-pp, is an article discussing flow measurement in sewage works. Complete with photos, tables, flow diagrams and dimension sheets, it covers fundamentals, principle devices used and, secondary instruments, controls, operation, and maintenance. Builders-Providence, Inc.

125 For Special Recording Jobs—"Technical Notes" includes 16 specification bulletins for those who require special recording charts. Subjects of the bulletins are chart paper, heat sensitive and electro-sensitive papers, roll chart core and punch sizes. Technical Charts, Inc.

PUMPS, PUMPING

127 Hydraulic Pumps, Controls,—Profusely illustrated, 56-pp Catalog 5001A describes oil-hydraulic pumps, controls and accessories for general industrial application. Provides engineering, design and application information relating to pumps, pressure controls, volume controls, directional controls, control assemblies, hydraulic motors, transmission, cylinders, and hydraulic accessories. Each unit is covered in detail along with photos, cutaway views and circuit drawing where required. Application suggestions and selection tips are included, also ratings, performance data. Vickers, Inc.

128 Plunger Pumps — Twelve-pp Bulletin W-414-B45A describes company's vertical triplex single acting plunger pumps with capacities to 225 gpm and pressures to 11,700 psi. Information is presented on use of these pumps in water flooding and salt water disposal, hydraulic press systems, hydraulic descaling systems, petroleum industry and other industrial process

BULLETINS

(Begins on page 21)

pumping. A rating chart lists data on size, speed, displacement, discharge pressure. Outline drawings, along with specifications and data on general dimensions and stuffing box information are included. Worthington Corp.

129 Hydraulic Pumps — Section I, 8-pp, presents technical data on a line of hydraulic oil pumps. Includes tips on selecting proper materials, construction details, dimensions and specifications, as well as performance graphs. Viking Pump Co.

130 Water Supply Pumps—Vertical turbine pumps for industrial and municipal primary water supply are described in 8-pp Bulletin 100. Sectional illustrations with enlarged views of special features describe products. Detailed drawings of pumping and distribution systems are also included. A condensed selection table gives horse-power and head-capacity ratings of the pumps. Layne & Bowler Pump Co.

131 Je Pump for Ash Handling—Design, construction, installation and operation of company's Hydro-Ejector is covered in Data Sheet Ea. Shows application of this jet pump in hydraulic mat rials handling systems, for pumping a mixture of solids (such as boiler bottom ash or iron pyrites) and water through a pipeline. Includes helpful table of capacities and related data. Allen-Sherman-Hoff Co.

MECHANICAL POWER TRANSMISSION

132 Dry Fluid Drive—Bulletin A-640, 12-pp, discusses operating advantages of Flexidyne—company's dry fluid drive. Illustrations, cross-section drawings of drive with taper-lock sheave and coupling with taper-lock bushing are included. Bulletin also shows two methods of selection with use of charts. Dimensional drawings, explanation of flow charge (dry fluid), and thermal protecting unit are other features, as well as recommended V-belt drives and list prices. Dodge Mfg. Corp.

133 Speed Changer—Operating advantages of Vari-Pitch speed changers are described in 6-pp Bulletin 20B6013D. Arrangement diagrams, a selection table showing recommended unit size for standard motors, and speed range table are included. Allis-Chalmers Mfg. Co.

134 Reference on Gear Making—Handsomely illustrated, this 44-pp brochure provides many views of gear-making operations. Shows principal types of gears, covers modern methods and techniques of gear testing, and explains trends in gearometry. Engineering graphs and tables, embodied in a gear design formula are included, along with other tabular matter and technical views. Subjects treated in this brochure include causes of early tooth failure, gear movement, use of smaller gears for given loads, costly load errors, hobbing, plating of gears. Also of practical help in gear selection is a set of standardized gear specifications. Sier-Bath Gear & Pump Co., Inc.

135 V-Belts—This 24-pp catalog describes company's line of Mor-Grip fractional horsepower and heavy duty multiple V-drive belts. Discusses various types of V-belts as to construction and applications and includes specifications. Among the belts described are super, steel cable, open end and hexagon V-belts as well as V-link belting. Maurey Mfg. Corp.

SPACE, PROCESS HEATING

136 Warm Air Heaters—Catalog GC-4-55 contains a cut-away illustration of a Thermobloc heater, photographic reproductions of five models as well as dimension drawings on floor set and suspended models. Installation photos are also included. Thermobloc Div., Prat-Daniel Corp.

137 Heater Exchange Plan—Bulletin 155-A gives details of a unit heater exchange plan for modernization and standardization of industrial heating systems. Explains how plan permits trade-in of old unit heaters on new ones of an equivalent size and type at liberal exchange prices. Advantages of plan are stressed. Modine Mfg. Co.

138 Packaged Heating Unit—Thermobloc warm air heaters are described as to design, use and advantages in this 8-pp illustrated bulletin. Dimensions and capacity data are provided for five models, three oil-fired, one gas-fired and one combination fired. More than a dozen industrial installations of these packaged heating units are pictured and described briefly. Thermobloc Div., Prat-Daniel Corp.

139 Induction Heating Units — Twelve-pp Bulletin 1441 describes induction heating units for heat treating, brazing, soldering, and heating for forming or forging. Descriptions and technical data on 5, 10, 25 and 50 kw sizes are listed. Included are water systems diagrams and a discussion of standard accessory equipment. Lindberg Engineering Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

140 Solenoid Valves — This 22-pp catalog consists of a series of bulletins, 85-98, illustrating and describing company's complete line of electrically controlled magnetic valves of the solenoid type commonly used to control the flow of water, oil, brine, chemicals, air solvents, gas and steam. Application, construction and operation of each valve is fully described and cross sectional diagrams explain operation. Specifications tabulated. Magnatrol Valve Corp.

141 Electrically Operated Valve—This 8-pp technical brochure, complete with flow charts, describes Electrofio—an electrically operated valve for controlling large flow volume. Charts, line drawings and dimensional data supplement text. Hays Mfg. Co.

142 Control Valves—Over 40,000 hydraulic and pneumatic control valves are described in illustrated 8-pp Folder 14. Six sizes of valves, ¼ through 1 NPT are illustrated, along with various actuating devices. Overall dimensions are shown on the photos, actuating devices are explained in detail as are various valve types, solenoid actuated valves and manifold mount valves. Versa Products Co., Inc.

143 Lubricated Plug Valves — Reference Book 39-5 is a 28-pp catalog covering straight-way, three-way, four-way and multiple port lubricated plug valves for 250 lb oil-water-gas and 150 lb steam working pressure. Includes dimensions, suggestions for use. Design and construction advantages are discussed. Booklet also presents wrenches and locking devices, extensions and floor stands, and lubricants for use in plug-type valves. Typical installations are pictured. Homestead Valve Mfg. Co.

144 Iron Body Gate Valves—Form 1005 describes company's line of iron body gate valves that have 150 lb steel valve features built into them. Sectional views illustrate chief features and a trim chart and general dimensions table is included. The Ohio Injector Co.

145 Corrosion Resistant Valves—Monel and nickel corrosion-resistant valves are described in Bulletin 9. Discusses corrosion-resistant properties of Monel and nickel, listing specific applications for which each is suited. Gives casting composition of both alloys and describes their mechanical properties. Cross-sectional illustrations of gate, globe and check-type valves are included. Alloy Steel Products Co.

146 Air Release Valves—Eight-pp Bulletin 1204 describes company's Type AGFD automatic air release valves, which provide a small unit having the functions of releasing automatically air accumulations from systems and pipe lines operating under pressure. Listed in bulletin is information on essential requirements, methods of installation, operation, construction, uses, weight, dimensions. Simplex Valve & Meter Co.

147 Stainless Tubing & Pipe—Bulletin TB-355, 6-pp, touches briefly on attributes of stainless steel and how it can be fabricated. Also included are tables of analyses, mechanical properties, creep strength, physical properties, oxidation resistance of nine stainless tubing steels. Tubular Products Div., The Babcock & Wilcox Co.

148 Cast-Steel Steam Trap—Section 230 describes company's Model 7 CS cast-steel steam trap, an inverted bucket type of trap which is efficient, low cost and designed for fast removal of condensate from higher pressure steam lines. Specifications and cut-away views are included. The Clark Mfg. Co.

149 Metal Hose, Joints—Eight-pp Catalog 149 presents flexible metal hose and expansion joints. Both corrugated and convoluted hose types are pictured along with construction details, application suggestions and specifications. Similar data is given on high and low pressure expansion joints. Flexonics Corp.

LUBRICATION

151 Automatic Grease Monkey—Bulletin A-2406 describes company's Metermatic pre-lubricated bearing design used on a-c d-c motors to automatically regulate grease flow to bearing and afford pressure relief against over-greasing. Illustrations show how it works, and brief text stresses advantages. Reliance Electric and Engineering Co.

152 Lubricating Equipment—Catalog 104, 26-pp, features company's line of industria lubricating equipment and accessories, including lubricators, gun fillers, hand guns, power guns, portable lubricators, pumps for transfer and supply, hose reels and accessories. Construction and operation advantages are outlined and specifications listed. The Aro Equipment Corp.

FILTRATION

153 Air Filters—Bulletin 117, 8-pp, describes Poro-Stone filters for compressed air and gases. Covers operation of a filter in which movement of compressed gas is used to achieve initial separation and second stage separation is by diffusion through a permanent Poro-Stone element. A few of the many applications of air filtration are pictured, others listed. Data is also provided on pipe line aftercoolers and cyclone separators. R. P. Adams Co., Inc.

154 Improved Oil Filters—Eight-pp Bulletin 101 describes company's Full Flow oil filters for in-line filtration of engine lube oils, fuel oils, industrial oils and coolants, solvents, washing solutions. Stresses design and application advantages of the filters, and includes specifications and dimensional data. Houdaille-Hershey of Indiana, Inc., Houdaille-Hershey Corp.

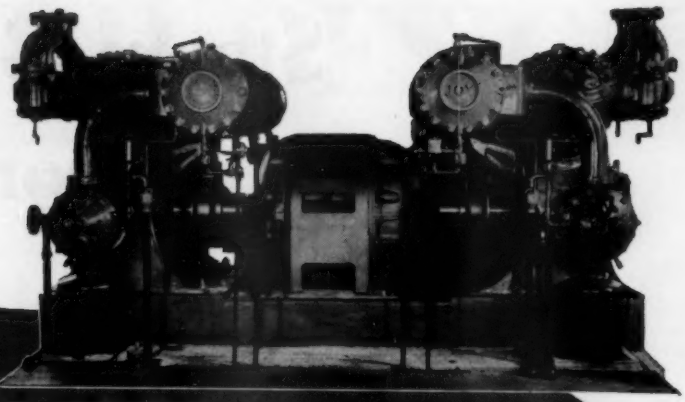
You'll save time in ordering Bulletins by using the Reader Service Cards provided on pages 215-216. Of course, we honor letterhead requests—but it takes us a bit longer to handle them.

155 Air Filters, Lubricators—In addition to a comprehensive presentation of this company's air filters and lubricators, this 20-pp catalog includes data on savings possible by correct filtration and lubrication at every air drop ahead of every air tool. Describes new methods of filtration. New products shown include the Hydro-Jector which automatically empties filters and other accumulators of trapped liquids and sludges; also a separable venturi, screw-in lubricator for close-quarter, close-coupled installations. Master Pneumatic, Inc.

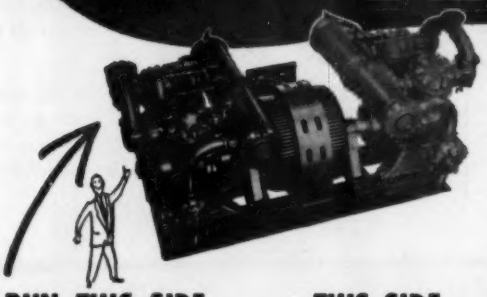
MATERIALS HANDLING

156 Solid Steel-Belt Conveyor—This 48-pp. book gives extensive engineering and application information on steel-belt conveyors. Illustrated with photos and drawings, book describes basic features and gives details on characteristics, capacities, adaptations and design. Typical steel belt conveyors as used in a variety of industries are described, along with conveyor components such as idlers, drive, discharge devices. Construction of typical conveyor is described, and properties of stainless and carbon belts are discussed. Standard widths and thicknesses for both single and longitudinally jointed belts are given, also load capacities. Data on conveying of materials and special applications are included. Available to qualified plant engineers. Sandvik Steel Belt Conveyors, Div. Sandvik Steel, Inc.

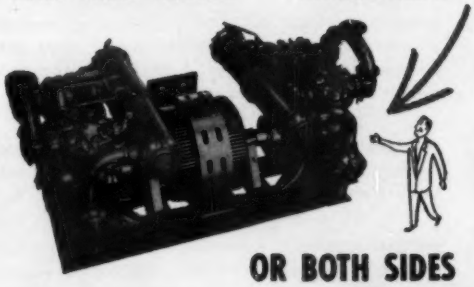
(More Bulletins on page 217)



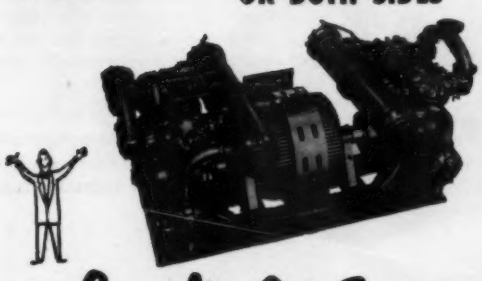
The JOY WN-114 TWIN is a 2-in-1 COMPRESSOR



RUN THIS SIDE... ...THIS SIDE



OR BOTH SIDES



SAVES FLOOR SPACE The Joy WN-114 Twin is actually two heavy duty, semi-radial compressors operating from a single motor. Because of the compact design and one power source, they make the most of limited floor space. The package-type units are delivered ready for mounting on a simple rectangular foundation.

USE ONLY WHAT YOU NEED Either compressor may be run alone by simply disconnecting its twin at the flexible coupling. As demand rises, the twin can be reconnected quickly, easily. This exceptional flexibility is ideal for plants where airpower demands vary greatly.

STANDBY INSURANCE The twin arrangement guarantees an "ace in the hole." When a conventional single compressor breaks down, its production stops completely. Under like circumstances, the Joy Twin continues at 50% capacity.

SAVES MAINTENANCE, OPERATING COSTS The WN-114 Twin is equipped with field-replaceable crosshead and cylinder liners and one-piece, box-type, tinned crossheads that require no adjustment. Patented "Dual Cushion" valves feature large area and low lift to give long, efficient, quiet operation. Displacement range is from 2372 to 3896.

For complete details on Joy WN-114 Twin Compressors, see your Joy representative, or write ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

for VANEAXIAL FANS • COMPRESSORS
VACUUM PUMPS AND BOOSTERS
OXYGEN GENERATORS

WADT-8488

JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

For more facts circle 517 on Reply Card

Steam Generators of offer important savings

Advanced design features of Foster Wheeler "SC" Series Standard Steam Generators mean maximum economy of installation, operation and maintenance

FUELS: Oil or Gas
CAPACITIES: 50,000 to 150,000 lb/hr
STEAM PRESSURES: to 1500 psi
STEAM TEMPERATURES: Saturated to 950 F

The "SC" Series Standard Steam Generator is the latest development by Foster Wheeler toward the reduction of steam costs for manufacturing and process plants. Pre-engineered in all details and standardized for economy, the new units are available in nine sizes with maximum input of over 200 million Btu/hr.

Although dimensions and structural details are fixed, the design provides a wide choice of temperatures and pressures, 48" or 54" upper drums, balanced draft or pressurized firing, type and location of heat recovery equipment, fans and drive, and make of burners for oil or gas firing.

The advanced features of this design, some of which are noted below, contribute to low installation, operating and maintenance expense and maximum dependability under continuous, full-load operation.

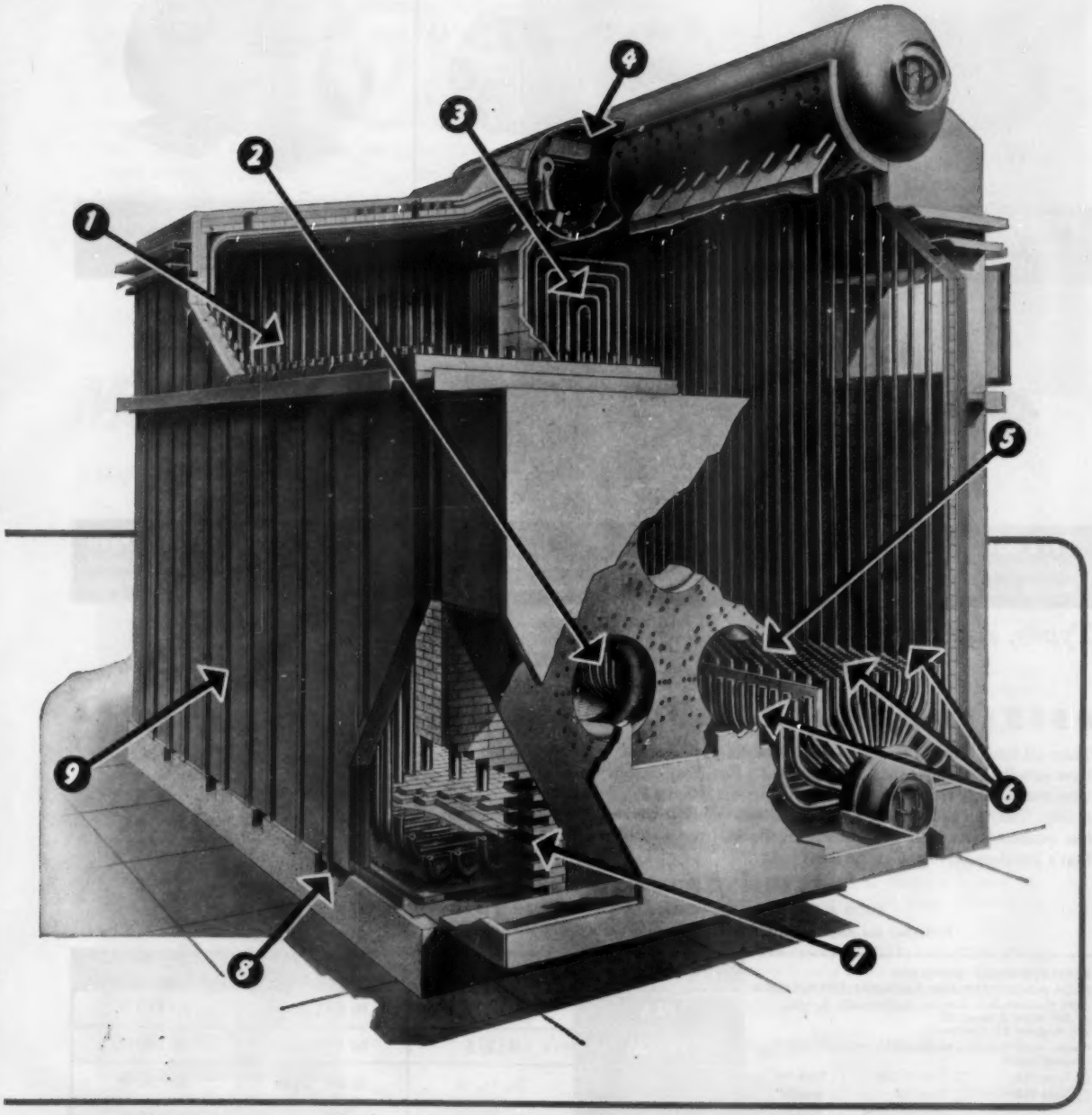
1. **COMPLETELY WATER COOLED FURNACE** with 3" OD closely spaced tubes minimizes setting maintenance and prevents excessive exit gas temperatures.
2. **OVER 19 FOOT FIRING DEPTH** permits long horizontal flame travel with minimum of ineffective or unused furnace volume.
3. **FULLY DRAINABLE SUPERHEATER,** available when superheat is desired, simplifies operation and eliminates a potential trouble spot.
4. **STEAM PURIFYING SYSTEM** consisting of horizontal separators, chevron driers and dry box provides steam purity of less than 1 PPM.
5. **EFFICIENT CONVECTION SURFACE** of 2" OD tubes in a staggered, cross-flow arrangement, combines maximum heat transfer with minimum draft loss. Single-pass boiler section eliminates baffles, dead gas pockets, and further reduces maintenance and draft losses.
6. **UNRESTRICTED CIRCULATION** — Absence of headers provides free circulation through integral risers and downcomers, eliminates header handhole plates and gaskets as possible sources of leakage.
7. **FULL INSULATION** together with the relatively close spacing of the furnace tubes, results in low casing temperatures.
8. **BOTTOM SUPPORTED UNIT** fully utilizes the structural strength of the steel tubes and provides for free expansion of all pressure parts within a stationary casing. This provides low unit stresses in all members and results in a rugged structure that is economical to erect and install.
9. **ALL WELDED CASING** forms a rigid, pressure-tight unit. Possible sources of air and gas leakage are reduced to a minimum, thus providing lower operating costs through more efficient combustion.

LONDON • NEW YORK
PARIS • ST. CATHARINES, ONT.

FOSTER

STANDARD DESIGN

in industrial steam costs



WHEELER

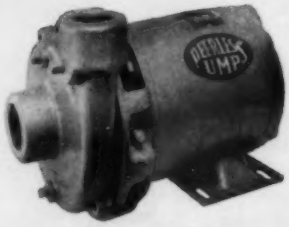
FOR COMPLETE INFORMATION on the "SC" steam generators, write to *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

For more facts circle 518 on Reply Card

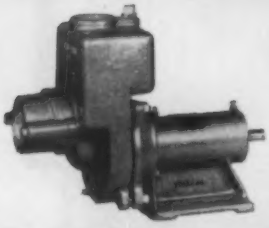
For PUMPS *you just can't beat the Line that's Complete*

TYPE PE-A ¼-1½ hp. Facemount design NEW NEMA type motor. Compact, efficient, shaft seal equipped.

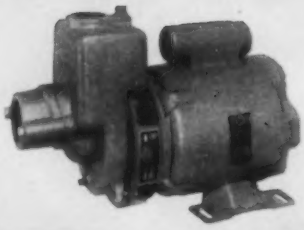
TYPE PE-200 2, 3, 5, hp. Economical, compact. Facemount design. Versatile, good looking.



TYPE PN ¼, ⅓, ½ hp. For low head pumping. Shaft seal equipped. New facemount NEMA type motor.



TYPE BSP ¾ hp. Close coupled, selfpriming pump. Excellently suited to high capacity pumping.



TYPE ESP ½, ¾, 1 hp. Facemount design. Ideal for swimming pools. Versatile, shaft seal equipped.

TYPE CP & TCP Vertical flanged suction pump. Open or explosion-proof motors. ¼ to 7½ hp. Excellent ratings.

Types, sizes, models for every need on every job!

PEERLESS GENERAL PURPOSE *Fluidyne*® PUMPS

They all have built-in quality,—that's Peerless craftsmanship. They all have excellent performance ratings,—that's Peerless efficiency. They all have remarkably trouble-free operating records,—that's Peerless dependability. They all are quality engineered, reasonably priced,—that's Peerless economy. And all are quickly available from two big factories,—that's Peerless service. Get the facts today.

PEERLESS PUMP DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
Factories: Los Angeles 31, California and Indianapolis 8, Indiana

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PEERLESS PUMPS

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FOOD MACHINERY AND CHEMICAL CORPORATION
2005 Northwestern Avenue, Indianapolis 8, Ind.
or 301 West Avenue 26,
Los Angeles 31, California.

Please send bulletins on pumps checked below

☐ Type PEA ☐ Type PE 200 ☐ Type PN
☐ Type BSP ☐ Type ESP ☐ Type CP
☐ Complete Line

Name_____
Company_____
Address_____
City_____ State_____
PE

PUMP	HP	CAPACITIES	HEADS
PEA	¼-1½	to 65 gpm	to 110 ft.
PE 200	2, 3, 5	to 190 gpm	to 140 ft.
PN	¼, ⅓, ½	to 60 gpm	to 30 ft.
BSP	¾	to 78 gpm	to 55 ft.
ESP	½, ¾, 1	to 69 gpm	to 50 ft.
CP	¼-7½	to 250 gpm	to 100 ft.

For more facts circle 519 on Reply Card

If it's a Magliner, you can be sure it's the *right* dock board because Magliners are engineered specifically for your dock conditions . . . your equipment and loads . . . and your operational requirements. Because they meet difficult and out-of-the-ordinary conditions, Magliner magnesium dock boards eliminate costly bottlenecks—and make loading costs go down. Dock traffic moves faster . . . smoother . . . safer!

Magliner Dock Boards *safely* speed loading operations and save valuable man hours. It will pay you to investigate how the *right* dock board (a Magliner) will step up dock handling efficiency in your operation. Write today for your copy of DB-204.

with a

Magliner Dock Board

you can show management Big Savings!

Safety factors in both design and construction fully meet your equipment and load requirements . . and provide positive insurance of safe, dependable, and economical long-life service.

Magliners are engineered to meet unusual and out-of-the-ordinary conditions. In this instance, the problem of cramped quarters and limited turning areas was solved with this wide, flared Magliner Dock Board. Most of the turn can be made on the board itself.

COMPARE THESE *Magliner* ADVANTAGES

1. TIRE-SAVER SAFETY CURBS—prevent truck run-offs and stop power truck tire damage. An exclusive Magliner feature.*

2. TRIPLE STRENGTH CURB ENDS—of special alloy, high strength magnesium . . . double tapered for wide angle turns. An exclusive Magliner feature.*

3. RUGGED AND PERMANENTLY ATTACHED UNDERSTRUCTURE fits snugly between dock and carrier to provide positive and automatic positioning—dock board cannot slip out of place!

4. CROWNED, so that the edges bear snugly against the dock and carrier to accommodate varying differences in height —for smooth, safe equipment crossover!

5. MAGNESIUM LIGHT—STRONG—SAFE! Made of the world's lightest structural metal . . . for easy one-man handling, maximum safety, and reliable service.

6. ADDED STRENGTH THROUGH STRESS RELIEVING—an extra safety advantage that can't be seen, but it's important.

7. BEVELED EDGES (maximum 10° slope) facilitate movement of valuable loads on and off the dock board—avoid hazardous load jar—eliminate equipment damage and load loss!

8. COMFORTABLE, ROOMY HAND GRIPS —sealed to exclude moisture. Optional full length hand rails for added safety and convenience.

9. SPECIALLY DESIGNED, FLUSH-TYPE LIFTING HOOKS to facilitate moving the dock board by power truck. (Offered as optional equipment.)

10. POSITIVE, ADJUSTABLE DROP LOCK —the *only* good solution for many ramp and dock board installations. Another exclusive Magliner feature.**

Write Today for Your Copy of Bulletin DB-204

*Pat. Pend. **Pat. No. 2659918

MAGNESIUM **DOCK BOARDS**

MAGLINE INC. • P. O. BOX 269 • PINCONNING, MICHIGAN

Canadian Factory: Magline of Canada, Limited, Renfrew, Ontario

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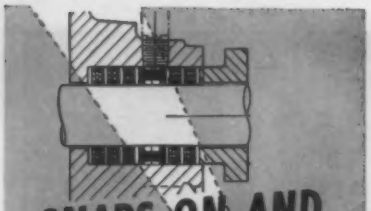


SNAPS ON AND OFF THE SHAFT

Quickly and Easily

CHEMPRO *Teflon* SEAL CAGES*

Flexible Chempro Teflon† Seal Cages, for lubricating or cooling stuffing box packing, snap on and off a shaft quickly and easily. They eliminate the time-consuming job of "pulling" the shaft required when conventional lantern rings are used. Machined in a single piece, they fit snugly, with no movement or vibration, even at very high shaft speeds. Their tough construction prevents bending or collapsing under extreme gland pressure.

Chempro Seal Cages do not score shafts as do two-piece metal lantern rings, eliminating the expense of replacing badly scored shafts.

For corrosive service they are unbeatable, lasting many times longer than metal rings under continuous contact with acids, organic solvents, thionyl chloride, etc., at normal and elevated temperatures.

They are made in sizes to fit any shaft diameter and stuffing box bore.

Write for new Chempro Bulletin on the patented Seal Cage.

THE ORIGINAL FABRICATORS OF TEFLON PACKINGS AND GASKETS

*Patented †duPont trademark

CHEMICAL & POWER PRODUCTS, Inc.

7 Broadway, New York 4, N.Y.

For more facts circle 521 on Reply Card

BACKTALK about our past issues

Edited by R. L. Marinello

Fire Alarm System

PLANT ENGINEERING:

"Please send all available information relative to the radioactive alarm system mentioned in the article 'Quick-Witted Alarm System Warns of Fire In Its Earliest Stages,' appearing on page 101 of your July, 1955, issue." *H. A. McIntosh, Product Analysis Engineer, General Controls, Glendale, California.*

PLANT ENGINEERING:

"I am very interested in more detailed information, especially in regard to capacities, price and materials of construction, of the Wemco 'Solids Pump,' which was the subject of an article in the July, 1955 issue." *R. W. Roberts, Plant Engineer, Dewey and Almy Chemical Co., Cambridge 40, Massachusetts.*

▶ Thank you for your interest in this article. Additional information on the C-O-Two Pre-Detector System will be forwarded to you by Robert Nathans, Opinion Builders, Inc., 420 Lexington Ave., New York 17, N. Y.—*Editors.*

Inquiry on Solids Pump

PLANT ENGINEERING:

"On page 111 of the July, 1955 issue of PLANT ENGINEERING, you have described a solids pump in the article 'Pump Handles Solids with Kid Gloves.'

"We would appreciate your giving us any information you can on this pump." *R. H. Byers, District Purchasing Agent, Aluminum Company of America, Cressona, Pennsylvania.*

▶ This pump is manufactured by the Western Machinery Co., 760-766 Folson Street, San Francisco 7, California. We are forwarding your request for more information to Mr. William F. Haddon of this company, who will see that additional data is sent to you.—*Editors.*

Preventive Maintenance

PLANT ENGINEERING:

"The interest in preventive maintenance seems contagious, and like another of your readers, whose letter you published in your Backtalk column of the June issue, our firm has adopted an inquiring attitude on this subject.

"It is gratifying to know that you have available for distribution a collection of articles on preventive maintenance which have appeared in past issues of PLANT ENGINEERING.

"We, therefore, would like to avail ourselves of this service and request that these articles be sent to us at your convenience. I assure you they shall be deeply appreciated." *Alfred Castelnau, Production Project Engineer, Kollsman Instrument Corp., Elmhurst, New York.*

Query on Controlling Odors

PLANT ENGINEERING:

"On page 97 in the July, 1955 issue of PLANT ENGINEERING, the author refers to Airkem Co., Inc.

"We cannot find any listing of this firm. Would you please send us their address?" *A. J. Nirosky, Purchasing Department, General Electric Co., Trumbull Components Department, Plainville, Connecticut.*

▶ The Airkem Co., Inc., is located at 241 East 44th St., New York, N. Y. We have taken the liberty of notifying them of your interest in receiving additional information on their equipment.—*Editors.*

Name of Manufacturer

PLANT ENGINEERING:

"We would like to have more information on the subject of demineralized water covered in the article 'Demineralized Water Helps Goodyear Maintain Quality,' appearing on page 118 of the July, 1955 issue.

"If you will advise us the name of the manufacturer of the water treatment equipment concerned, we shall appreciate it." *R. O. Fristoe, Plant Engineer, Link-Belt Co., Indianapolis, Indiana.*

▶ The manufacturer of the water treatment equipment described in the article is The Permutit Co., 330 West 42nd St., New York 36, N. Y. We are quite certain that if you contact them or the local Permutit man in Indianapolis that they will be able to give you complete information on the equipment.—*Editors*

Plans to Build Partitions

PLANT ENGINEERING:

"Concerning the article 'How Norton Company "Builds Its Own"' in the October, 1954 issue of PLANT ENGINEERING, I am interested in getting more information, if possible.

"I'd appreciate additional data on the construction of these partitions, as we are planning an office expansion and rearrangement.

"Can you give me, or would you please

BETZ • *A Great Name In Water Conditioning*

Meet your V.I.P.

The Betz Sales Engineer, a *Very Important Person?*

We think so.

With his experience and full knowledge of water conditioning, and with the facilities of the *entire* Betz Organization to assist him, he is ready to step in and recommend ways and means to achieve more efficient, economical plant operation through proper water conditioning.

It's his job to work shoulder to shoulder with you and your operating level personnel ... assist in setting up correct systems of control ... keep you fully abreast of the latest developments in Betz water conditioning technique ... and a host of other services, from "trouble-shooting" to being a real part of your team.

Chances are, a Betz Sales Engineer can be the most important visitor you may receive today. Let him tell you how Betz *completely-integrated* water conditioning service can help you with your problem that's "different". You'll be glad you did.

W. H. & L. D. BETZ, Gillingham & Worth Streets, Philadelphia 24, Pa. In Canada: BETZ Laboratories Limited, Montreal 1.

BETZ

CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

Ask these questions, too, when you judge a fluorescent lamp...

Is its phosphor factory-controlled for color match?

Westinghouse makes its own fluorescent lamp phosphors . . . to be sure of strictest uniformity. Thus *you* can be sure that the Westinghouse lamp you buy today will exactly match the Westinghouse lamp of the same color classification you bought yesterday or years ago.

Are its electrodes built for longest lamp-life?

Constant development of new and better ways to make fluorescent lamp electrodes has enabled Westinghouse to *triple* the life of its fluorescent lamps since 1948.

Is it the correct type, size and color for the lighting job to be done?

In the Westinghouse fluorescent family of 290 different lamps—including Slimline and Rapid Start—there's a type and size precisely right for every office, plant and merchandising application. Colors include seven different shades of "white" alone.

For the full story on how to get more for your money in fluorescent light, contact your Westinghouse Lamp Representative.

YOU CAN BE SURE...IF IT'S

Westinghouse

For more facts circle 523 on Reply Card

BACKTALK

refer me to a source for such information? I am particularly interested in knowing why 1¼ by 2⅜ in. stock was used." *Gerald Weese, Plant Engineering Department, Midwest Manufacturing Corp., Galesburg, Illinois.*

▶ We are forwarding your request for more information to Mr. Roger N. Perry, Jr., Norton Company, Worcester 6, Massachusetts.—*Editors.*

Data on Fire System

PLANT ENGINEERING:

"Will you kindly send me additional information on the Autocall fire protection system mentioned in the article 'Ha!t "Galloping Obsolescence" at Northrop's Palmdale Facility,' appearing in your July, 1955 issue." *H. P. Kirk, Melrose Park, Philadelphia, Pennsylvania.*

▶ We are notifying Mr. Todd Fast of Northrop Aircraft, Inc., of your interest in getting more information on the Autocall system. You may also wish to contact the manufacturer of this equipment, the Autocall Company, 1934 Warden Avenue, Shelby, Ohio.—*Editors.*

Atomic Studies "Down Under"

PLANT ENGINEERING:

"I would very much appreciate it if you would put my name on your mailing list for 'Atomics.' Interest is now rapidly spreading throughout Australia in the subject and construction is shortly to commence on several atomic reactors. I am now attending a series of introductory lectures presented jointly by the University of Sydney and the Sydney University of Technology, on the Engineering and Technology of Atomic Power." *E. Kolesnik Wollstonecraft, Sydney, N.S.W., Australia.*

▶Mr. Kolesnik's request adds another to the long list of recipients of 'Atomics,' which is written by A. W. Kramer, member of the Advisory Committee to the AEC. Attention was first focused on this publication in the September 1954 issue of PLANT ENGINEERING in connection with the article entitled, "Industrial Isotopes —A Review of Their Uses."—*Editors*

Construction Briefs— Second Series Reprinted

PLANT ENGINEERING:

"I have been reading with great interest the series of articles appearing in PLANT ENGINEERING, entitled 'Construction Briefs,' prepared by Byron A. Engelbach.

"I have the articles appearing in the March, July, September and November, 1954 issues and the January, 1955 issue. However, through some error I failed to receive the May, 1954 issue.

"Will you kindly let me know whether any articles appeared on the above subject prior to March, 1954 and if it will be possible to receive a reprint of May, 1954 'Construction Briefs,' which will complete this review if no articles appeared prior to March." *H. H. Welch, Jr., Plant Engineer, Virginia Maid Hosiery Mills, Inc., Pulaski, Virginia.*

▶ The first article in this series appeared in July of 1953. You, and possibly other readers, will be interested in knowing that we reprinted the first six articles in this series which includes the May, 1954 article you are interested in receiving. The reprint costs 50 cents a copy.

Readers who are making a collection of this series will be happy to know that the second series of six articles has also been reprinted. This reprint covers the articles from July, 1954 to May, 1955. It also is available at 50 cents.—*Editors*

Articles Unselfishly Written

PLANT ENGINEERING:

"We read with interest the many articles you publish each month in PLANT ENGINEERING. Most of these articles seem to have been written unselfishly

and with a true effort to help the process industries.

"Handling of dry materials is one of our major problems and one which has not been fully developed. The article on electronic weighing in the May, 1955 issue is very timely, and we would appreciate your mailing us three sets of tear sheets of this article for our files." *A. C. Ullrich, Chief Engineer, Durex Plastics & Chemicals, Inc., North Tonawanda, N. Y.*

Cherry Hill Request

PLANT ENGINEERING:

"Will you kindly let us know how we may obtain reprints?

"In particular, I am interested in the 'Cherry Hill' article in the December, 1954 issue. I'd appreciate your notifying us how we may get three reprints of this article." *D. C. Chichester, Engineering Department, Martin Stamping and Stove Co., Huntsville, Alabama.*

▶ We still have a number of reprints of this article available and are sending you the copies requested. We previously carried an announcement on these reprints, saying that the first copy would be sent free of charge and any additional reprints would be 50 cents each.—*Editors.*

How to judge a fluorescent lamp ...point No. 1

ask about **HALO PHOSPHORS**

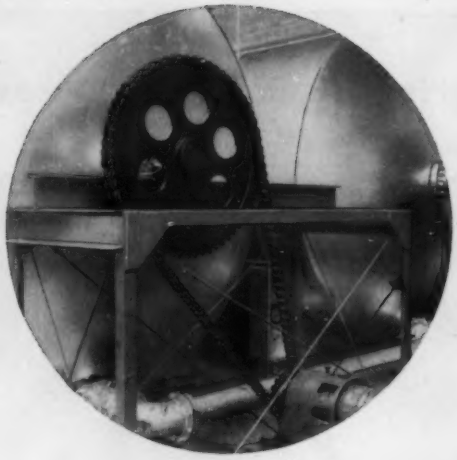
The "phosphor" in a fluorescent lamp is the light-producing coating inside the glass tube. Only if the phosphor successfully resists deterioration will the lamp—*1*) continue to give high light-output and—*2*) retain its original color to the end of its long life. Tops for deterioration-resistance among the different types of phosphors now in use are *Halo* Phosphors. Westinghouse (and only Westinghouse) uses Halo Phosphors throughout its entire fluorescent lamp line.

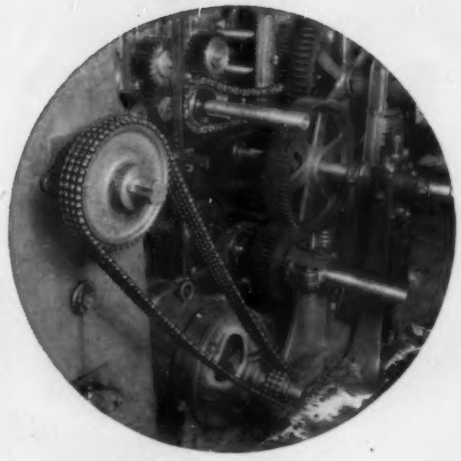
YOU CAN BE SURE...IF IT'S Westinghouse

For more facts circle 524 on Reply Card

DIAMOND ROLLER CHAIN DRIVES

to keep your production UP!





From motor to driven shaft, one shaft to another or several,—you will find smooth running, non-slipping Diamond Roller Chain in the pitch size, length, single or multiple strand—that will solve the problem, maintain 98-99 per cent efficiency and 100 per cent speed ratio.

Your production is maintained at the level desired, with no unnecessary time out for adjustments or frequent repairs . . . You can make greater use of Diamond Roller Chain now than you have in the past,—plenty of applications that will further improve your overall output economically.

Stock Roller Chains and Sprockets are carried by Diamond Distributors all over the country—for handy reference write for Stock Catalog 754.

DIAMOND CHAIN COMPANY, Inc.

Where High Quality is Traditional

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Offices and Distributors in All Principal Cities

Please refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

STOCK CHAINS & SPROCKETS

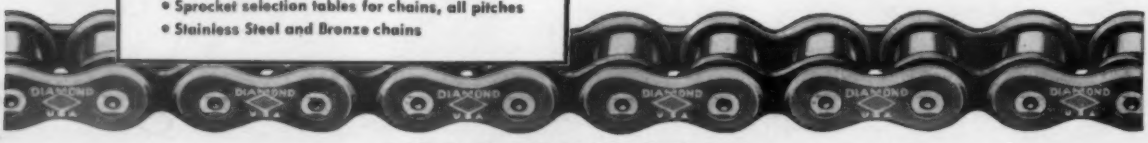
Write for Catalog 754 Stock Roller Chains and Sprockets

CONTENTS INCLUDE:

- How to select Stock Roller Chain Drives
- Ready-to-use chain length tables
- Table of speed ratios for sprocket combinations
- Sprocket selection tables for chains, all pitches
- Stainless Steel and Bronze chains

The Roller Chain is DIAMOND

TRADE ◇ MARK



For more facts circle 525 on Reply Card

For more facts circle 526 on Reply Card——→

Problem:

How would you protect this key motor?

STOCK A COMPLETE MOTOR?	☐	STOCK A COMPLETE ARMATURE?	☐	STOCK ARMATURE COILS?	☐	STOCK NO CRITICAL PARTS?	☐

TURN PAGE AND SEE G.E.'S Productive Maintenance ANSWER ➤

GENERAL ELECTRIC

HERE IS A TYPICAL PARTS PROTECTION ANALYSIS

(This evaluation is based on the failure of a part which requires the longest repair time, such as armature coils)

	NO CRITICAL PARTS STOCKED	ARMATURE COILS STOCKED	COMPLETE ARMATURE STOCKED	COMPLETE MOTOR STOCKED
REPAIR TIME	10 days to make coils X	6 days to rewind armature X	7 hours to install new armature	3 hours to replace motor
TOTAL DOWNTIME COST	$168,000	$100,800	$4,900	$2,100
COST OF PARTS PROTECTION	0	Coils: $4,664	Armature: $25,600	Motor: $46,000
COST OF REPAIR	$12,730	$5,900	Installation: $850	Installation: $360
TOTAL FAILURE COST	$180,730	$111,364	$31,350*	$48,460*

X Add disassembly, assembly and transportation time to actual time.

* Add repair cost, on straight time basis, of failed unit.

THIS IS AN EXAMPLE—taken from an actual case history—of how you can carry out Step 4 in General Electric's *Productive* Maintenance plan. To begin with, assume the worst: an armature failure which would require lengthy downtime, at $700 per hour. The motor involved is a 500-hp slow speed d-c motor on a machine critical to production. When all figures are added, it is evident that stocking of a complete armature is the most economical protection for this specific motor. Your G-E representative can help you make the right decision about better protection for each of your critical drives.

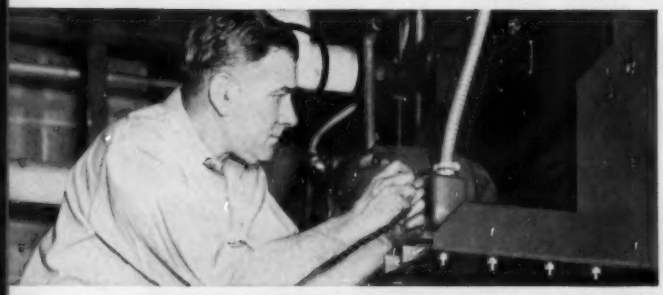
THIS EXAMPLE SHOWS YOU HOW...

Productive Maintenance

The problem of keeping your key electrical equipment in operation isn't a simple one these days when the equipment and the production lines are becoming more and more complex. To solve the problem, you must bring to bear more maintenance know-how and specialized skills than ever before. More and more, the responsibility for increasing production—through more effective maintenance—rests on your shoulders.

This *Productive Maintenance* 5-step plan can make your maintenance budget more effective...

1. Gather complete equipment data. A record system of this inventory is a basic part of your program.



2. Determine amount of routine maintenance necessary for your system. Your G-E representative will help.

3. Put your record system to work. Set up inspection cycles, work orders and systematized stocks.

4. Inspect and evaluate all equipment vital to production. This data will help you determine the parts protection needed for each key item of electrical equipment.

5. Establish a critical maintenance program by stocking parts on a planned basis and scheduling overhauls well ahead of the actual maintenance date.

CUTS TOTAL COST OF BREAKDOWNS

General Electric's five-step *Productive* Maintenance plan can help you meet this responsibility. This plan is essentially an application of men, materials, and tools. (See 5 steps at top of page) By organizing this idea into simple steps, you can get more effective maintenance, more production from each machine and a smoother work flow.

Your General Electric Service Shop or renewal parts representative can give you the complete *Productive* Maintenance story. Ask him to arrange a showing of the G-E sound-color film on *Productive* Maintenance and to give you specific help and suggestions in setting up your own program. Or, fill in the convenient coupon on the next page and ask for General Electric brochure, "5 Steps to *Productive* Maintenance."

GENERAL ELECTRIC

TURN PAGE FOR PRACTICAL HELP

Call in a G-E representative for help in starting your own *Productive Maintenance* program

TRAINED ASSISTANCE in planning overhaul schedules (step 5) is yours for the asking. Your G-E Service Shop representative is a specialist who will work with you in setting up each step in a *Productive* Maintenance program specifically designed for your own plant.

COMPLETE PARTS DATA is essential. G-E Renewal Parts specialists can help you tailor a renewal parts program for your plant, and also guide you in establishing your parts inventory system (steps 4 and 5). Take advantage of this expert help.

Plan your overhauls this way: Systematically remove from operation the equipment that needs overhauling most. Do this at the most favorable time from your production standpoint. These planned, short-term outages take far less time and expense than unplanned shutdowns. Your G-E Service Shop representative can help assess your equipment's condition, and utilize G-E Service Shop facilities to make your *Productive* Maintenance program fully effective.

When setting up your *Productive* Maintenance program, steps 4 and 5 are most important. It will pay you to ask G-E maintenance experts for guidance in organizing your renewal parts budget so every dollar gives the most protection possible. This will help your maintenance become productive faster. Most parts are carried by a nation-wide network of strategically located G-E warehouses, as well as distributors in your area.

Productive Maintenance—as vital as production itself!

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY
APPARATUS SALES DIVISION, SECTION 801-16
SCHENECTADY 5, NEW YORK

- ☐ Please send me the detailed manual "5 Steps to *Productive* Maintenance" (GEA-6087).
- ☐ Please have a G-E representative call on me.
- ☐ I'd like to arrange a showing of the 25-minute sound-color movie, "*Productive* Maintenance."

NAME_____ POSITION_____

COMPANY_____

CITY_____ STATE_____

Keep it Clean with felt

Washing machines need good, tight, long-lasting seals to keep water where it belongs, oil and grease in the right places, too. Felt seals by American protect the trouble-free reputation of many products of all kinds from tractors to electric motors. It is important to select the right quality for every application. American engineers will collaborate with you on specifications.

Seals are available from American in plain felt, or laminated with one or more layers of impervious, oil-proof Hycar. Tell us what you want a seal to do and we will show you the seal that should do it.

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For more facts circle 527 on Reply Card

←For more facts circle 526 on Reply Card

Venturafin Unit Heaters give you

Venturafin Vertical Unit Heaters for ceiling-

(58,400 to 560,000 BTU at 2 lbs. steam pressure and 60° F. entering air)

Copper coils for efficient heat transfer

Non-ferrous fins, spirally wound on seamless copper tubing, give efficient, economical heat transfer. Ample spacing between fins cuts clogging from dust, dirt.

High ceilings

EQUITEMP AIR DIFFUSER LETS YOU

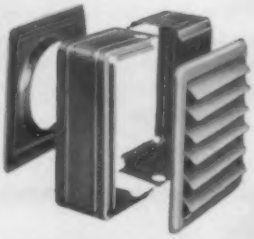
Average ceilings

Venturafin Horizontal Unit Heaters for wall-

(18,000 to 357,500 BTU at 2 lbs. steam pressure and 60° F. entering air)

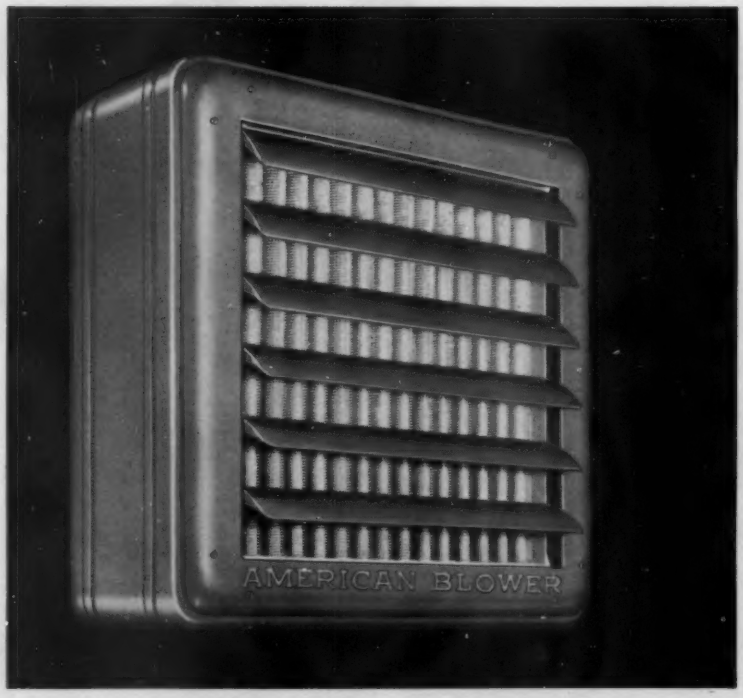
Casings of steel for long life

Steel casings are finished in baked enamel; hardware is cadmium plated. Die-formed horizontal louvers are standard; louvers available in other arrangements for special needs.



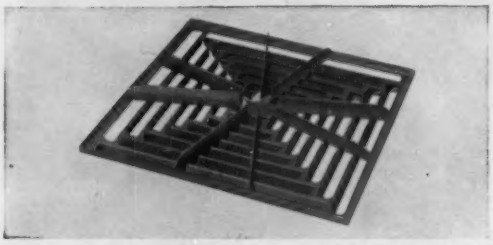
Fans strengthened against de-pitching

Fan wheels are rigidly constructed for maximum efficiency, quiet operation. Blades are of heavy-gauge aluminum, with strengthening beads to eliminate de-pitching under load.



efficient heating at low cost

to-floor heating



Equitemp Air Diffuser for uniform warmth

Exclusive Equitemp Air Diffuser extends approximately one inch below heater casing — permits mounting above craneways. Unique design produces temperatures at breathing level that vary less than one degree.

ADJUST THE HEAT TO THE JOB!

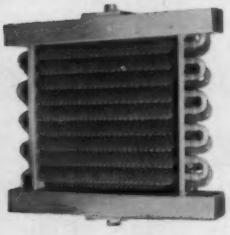
Low ceilings

Indirect heating

To eliminate blasts of air at low mounting heights, simply adjust the vanes on the Equitemp Diffuser. This creates a cone of heated air that mixes with room air; gives even temperatures.

to-wall heating

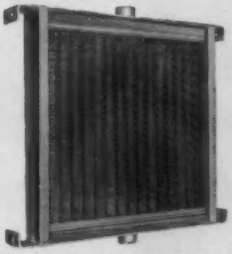
Serpentine coils for hot water



Serpentine coils — specially designed for hot-water systems—have seamless copper tubes for protection against erosion and corrosion. All coils are free-floating to allow for expansion.

One- or two-row steam coils

Horizontal heaters are furnished with either one- or two-row steam coils for high- or low-pressure systems. Special, multi-fin diffusers are available for unusual air-flow applications.



Are you remodeling? Expanding? Insist on American Blower Venturafin Unit Heaters! Many sizes . . . priced with the lowest . . . easy to install . . . economical to operate!

HERE'S A horizontal heater that's truly quiet . . . a vertical heater with heat-flow control — both in a wide range of sizes!

Horizontal models have separate coil systems for either steam or hot water. Extra heating capacity of exclusive serpentine hot-water coils lets you install smaller units in many cases! Heat transfer is efficient, economical — thanks to seamless copper tubing with non-ferrous fins. And louver panels may be adjusted to deflect heat up or down!

Vertical models feature American Blower's adjustable Equitemp Air Diffuser — lets you tailor heat flow to the job! Anemostat or vane-type diffusers also available.

Casings on Venturafin Unit Heaters are ruggedly constructed of heavy-gauge furniture steel, die formed for perfect fit and freedom from rattles; finished in gleaming, easy-to-clean baked enamel.

For full data on low-cost, efficient Venturafin Unit Heaters, call in your American Blower jobber. Or write us direct — ask for Bulletin 7517.

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For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Aluminum Strip to Tube

ALUMINUM TUBE can be produced directly from strip in a process developed by The Yoder Company, Cleveland, Ohio.

The tubing, which can be formed by fabricators in their plants, is made by passing precision-rolled aluminum strip through forming rolls. A high frequency electric current (450,000 cycles) heats only the edge of the strip at the point where the edges abutt as the tube moves through the welding head at 100 fpm. No metal is added.

Other rolls next squeeze out the molten metal, leaving a narrow weld zone. This eliminates the use of weak, cast metal, so that the weld zone has strength equal to that of the unwelded tube.

Since the tube is made from precision-rolled strip, the wall thickness is uniform. More exact dimensions obtainable in tube made by this process permit fabricators to reduce clearances on tube forming tools, thus reducing the possibility of gouging, scuffing and the like. Additional savings are also possible by standardization of tools. Extra operations such as reaming and sizing are not necessary to match pieces of tube.

Tubing 0.5 to 0.83 in. diam can be made by this method. The process is said to be suitable for working the non-treatable aluminum alloys, 5050 and 5052, which, without heat treatment have as much, or more, yield strength as those alloys which must be heat treated to obtain required s.rengths. *From Technical Advisor, published by Reynolds Metals Company, Louisville, Kentucky.*

Modified Lift Trucks Negotiate Rough Road

THREE SPECIALLY designed, high under-c'earance fork lift trucks are helping to overcome "rough road" problems in open hearth maintenance at Inland Steel Company, Indiana Harbor, Indiana.

Loaded lift trucks must cross railroad tracks running parallel to lines of furnaces. These tracks have a slag base fill and track height is sometimes as much as 2 in. above floor level. Cement cannot be used for the floor because it would "explode" on contact with hot steel or slag.

(Continued on page 42)

Modified diesel truck permits easier handling of refractory brick used in maintenance of open hearth furnaces

Remote Control of Fuel-Truck Loading Speeds, Safeguards Operations

A SYSTEM OF remote controls and intercommunication between the main gate and control tower of the loading rack at our Frontier refinery has facilitated the loading of as many as 13,500 bbls of fuel oil in 24 hr.

The loading rack is located at the main gate of the refinery. Trucks entering the plant for loading are cleared by the gateman, through the intercommunication system, with the product control man in the tower.

The type of product required for each individual order has already been relayed from the office to the dispatcher at the refinery, so that while the truck is traveling from the gate to a specified loading bay, a loading ticket is prepared in the control tower.

After the product control man has observed the correct grounding of the truck, the prepared ticket is inserted into a remote control meter, which is located in the tower.

A manually operated valve, placed directly underneath the ticket printer, is opened to provide air pressure to the head of a pneumatically operated valve. This air pressure can open or close the product valve in the line going to the meter and loading arm of the product indicated on the order. Alongside the tower is a 60-ft scale with recording dials in the tower, for weighing the trucks.

Use of manually operated valves adds safety to the loading operations, since the flow of fuel to the trucks can be cut off immediately in case of fire or overloading of the truck. The valve also controls unauthorized withdrawal of a product and eliminates the possibility of an error in the type of product delivered. *From Ashland Oil Log, published by Ashland Oil & Refining Company, Ashland, Ky.*

View of control room for loading rack shows pump starter controls being operated

For more facts circle 529 on Reply Card ——→

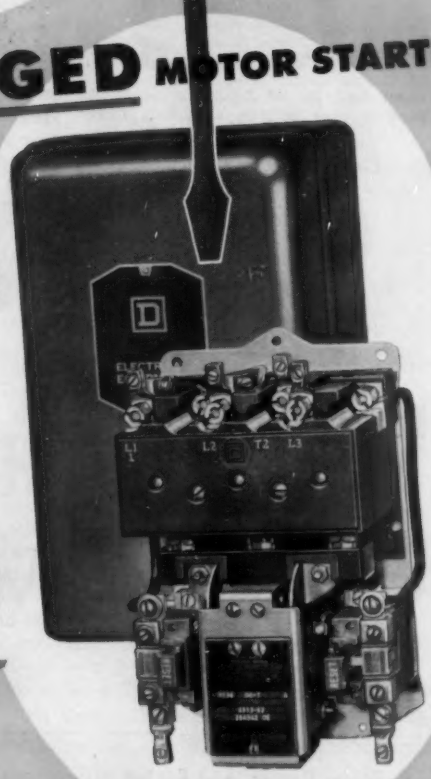
Qwik Change

with PACKAGED MOTOR STARTER PARTS!

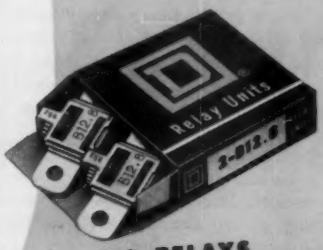
INTERLOCKS
A wide variety of quick-change, front-mounted interlocks adds flexibility for special applications

CONTACTS
Packaged replacement contacts are easily installed without disturbing wiring

PUSH BUTTONS AND SELECTOR SWITCH
These Kits contain all parts necessary to make quick changes from standard starters to either push button or selector switch controlled devices



COILS
Screwdriver is only tool required for quick change of magnet coil to accommodate different voltages



O. L. RELAYS
A wide variety of easily selected, packaged overload relay heater units provides quick changes to meet varying requirements for overload protection

EASY to Identify!
EASY to Buy!
FASTER to Install!

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

The new trucks are Buda-Diesel 6,000-lb models, equipped with torque converters and modified to specifications which originated with Inland's open hearth operating and maintenance personnel. They are used for handling refractory brick in round-the-clock maintenance of 24 furnaces.

Changes in the design of the truck wheels and frame have doubled the clearance obtained without impairing either their power or maneuverablity. A special type quadrant steering mechanism compensates for acute wheel shock encountered in moving over the raised railroad tracks.

The special design has also made possible the handling of double loads of 9-in. silica brick with speed and safety. *From a release of Lift Truck Service Company, Chicago, Illinois.*

Tower Balances On a Ball

A 250-FT STEEL tower was needed by an oil refinery in Wales, Great Britain, to carry its flare stack to a height where flammable gases could burn off without endangering the surrounding community.

Instead of bracing the tower, which had to be built on a marsh, with foundations sunk deep into the ground, the company rested the 42,000-lb thrust of the tower on a rocker bearing, the curved plates of which were registered in position by a 2-in. diam steel ball. Steel guy wires hold the tower firmly in place, yet are sufficiently flexible to permit the tower to sway with the forces that might otherwise break it. *From Steelways, published by American Iron and Steel Industry, New York, N. Y.*

Steel ball is set in place ready to receive base section of 250-ft tower

Guy wires hold tower, balanced on articulated joint, steady in high winds

Chemically Etching Metal Parts

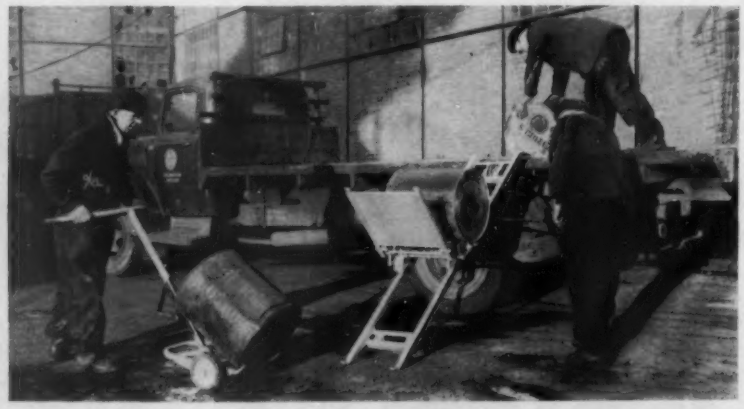
WHEN WE needed a copper wire circuit laminated between layers of Fiberglas cloth, the conventional method for making the circuit proved unsuitable, since the cloth had a protrusion on its exterior due to the diameter of the wire. The problem was to reduce the cross sectional area of the wire without decreasing the current carrying capacity. To meet these requirements we used a quick, relatively inexpensive way of producing sheet metal stampings by a chemical etching process developed in our plant.

With this method, in principle like that used by photo engravers, sheet metal stampings can be made without the aid of mechanical dies and the set up costs involved in mechanical metal removal methods.

Metal parts are made by first creating a black and white master drawing in any scale that will show details of the part. This drawing is transferred to the desired metal by photo engraving, metal lithographing, or silk screen printing, using a specially developed ink or compound. The unwanted material is then etched away and the remaining metal becomes the desired part.

To make the copper wire circuit we needed, the circuit was etched from flat copper sheet stock, bonded to a 0.003-in. soft Fiberglas cloth that would conform to any contour, and

Two Drum-Handling Devices Make Work Safer, Faster, and Easier



Handling heavy drums at Imperial Chemical Industries, Billingham, England plant is safer and easier since introduction of a specially designed truck (left). Truck has mobile hook which catches on rim of drum while curved forks slide easily under the drum as it is tilted backwards. Skid, (above) fitted with friction brake winch holds drum-carrying cradle in any position, allows one man to winch up drum in 15 sec. (From Target, published in London, England.)

WHAT	WHERE	WHY
SUNVIS 900	**In tight systems** where oil is rarely changed and little or no make-up is needed.	**Exceptionally long life** of oil keeps overall costs low.
SOLNUS	**In tight systems** where make-up oil is less than 5% per month.	**Moderately priced**... excellent stability and rust protection.
SUNTAC	**In leaky systems** where make-up average is 5% or over per month.	**Reduced leakage** in systems cuts oil costs and downtime.
CIRCO	**In systems** where oil is continuously diluted by water, cutting fluids and other contaminants.	**Low-priced**... excellent protection where oil must be changed frequently.
SUNVIS H.D. 700	**In systems contaminated** by dust and deposits of sludge, varnish, etc.	**Cleansing action** removes deposits and eliminates costly teardowns.
LUBEWAY	**In dual purpose systems** of machine tools where hydraulic oil is also a way lubricant.	**Added film strength** of this hydraulic oil also eliminates "stick-slip" on ways.

CHART SHOWS WHERE AND WHY SUN HYDRAULIC OILS SAVE MONEY

As the chart shows, to operate your hydraulic system at maximum efficiency and minimum cost you must consider the condition of your hydraulic system, as well as pressures, operating temperatures and other usual factors.

And, very important, you must consider the age of your system. Continued use of original oil recommendations can be costly. A change in the type of oil can often result in substantial savings...especially where systems have developed leaks or where sludge and varnish cause excessive maintenance.

For complete information about how Sun hydraulic oils can help you cut operating costs of your hydraulic system, see your Sun representative...or write SUN OIL COMPANY, Philadelphia 3, Pa. Dept. PY-9.

SUNOCO

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

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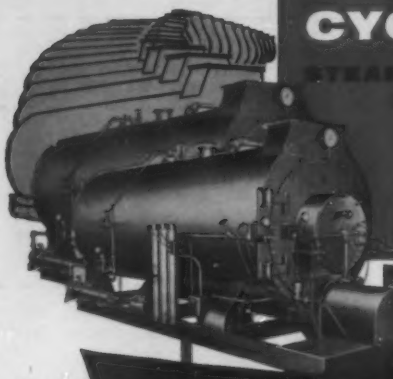
- PROCESSING
- AIR CONDITIONING

THOUSANDS of

CYCLOTHERM

STEAM AND HOT WATER GENERATORS



18 ____ 500 hp.
15 ____ 200 psi.

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For Dairies and Food Plants

For Dry Cleaners and Laundries

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Satisfied users say "Cyclotherm Steam and Hot Water Generators will meet your requirements under the most exacting steam demands and rugged operating conditions . . . in a variety of climates and elevations.

Thousands of enthusiastic owners are the finest assurance *any* boiler manufacturer can offer potential customers. Cyclotherm has this assurance and one of the best re-order records in the Steam Generator industry.

Owners are enthusiastic because Cyclotherm offers them:

1. ***Exclusive Cyclotherm Cyclonic Combustion*** **. . . unequalled by any other combustion method in efficiency and economy.**
2. **Minimum guarantee 80% efficiency in only 2 passes . . . with gas, oil or combination.**
3. ***Up to 50% savings in maintenance costs.***
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6. ***Factory-trained Service Engineers*** **. . . available weekdays and weekends.**

WRITE TODAY for your free copy of the illustrated, informative booklet with all of the advanced space—time—and cost-saving features of Cyclotherm Steam and Hot Water Generators. Join the thousands of cost-wise, efficiency-minded buyers who order Cyclotherm whenever steam is required

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STEAM AND HOT WATER GENERATORS

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Gentlemen: Please send me a free copy of your fact-filled booklet on Cyclotherm Steam and Hot Water Generators.

NAME_____TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ZONE___STATE_____

For more facts circle 531 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

then laminated between layers of Fiberglas. This resulted in reduction of the wire diameter from 0.016 in. to 0.005 in. and eliminated any protrusion in the finished circuit.

Aluminum, copper, bronze, brass, steel, berrylium, titanium, and chrome plated sheet stock are some of the materials that can be processed by this method without affecting their physical properties. *From a release of Chance Vought Aircraft, Inc., Dallas, Texas.*

Grinder Rest

Worn rest made it difficult to reproduce correct grinds on carbide chipping and finishing tools, but wear-resisting carbide tool blank brazed to rest solved wear problem. (From release of Carboloy Dept., General Electric Co., Detroit)

Sprockets Machined On Modified Lathe Chuck

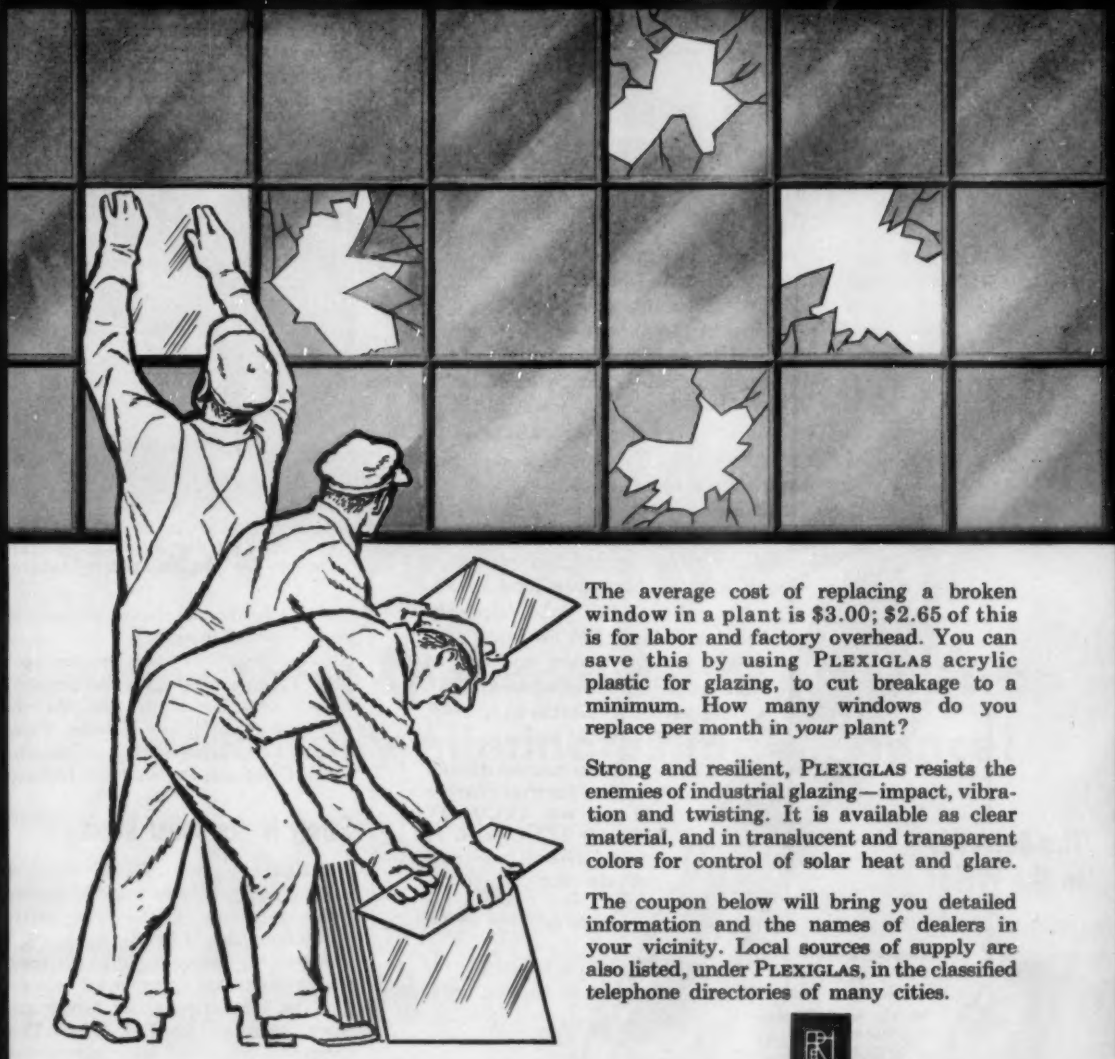
IN THE SPROCKET department of our plant, some jobs require the drilling and tapping of holes at various angles in the sprocket hubs. This was done by securing the sprocket in a jig, drilling one hole, then turning the sprocket to the correct angle and repeating the operation on the next hole.

This method was slow, and at the same time, made it difficult to maintain uniformity of successive angles.

At the suggestion of Billy Ross of the department, an old lathe chuck, removed from a welding machine, was reworked and modified so that it could be mounted on the bed of the drill in a manner which would allow it to rotate 360 deg. Degrees were marked on

For more facts circle 532 on Reply Card

Most of the cost is labor — Save it with



The average cost of replacing a broken window in a plant is $3.00; $2.65 of this is for labor and factory overhead. You can save this by using PLEXIGLAS acrylic plastic for glazing, to cut breakage to a minimum. How many windows do you replace per month in *your* plant?

Strong and resilient, PLEXIGLAS resists the enemies of industrial glazing—impact, vibration and twisting. It is available as clear material, and in translucent and transparent colors for control of solar heat and glare.

The coupon below will bring you detailed information and the names of dealers in your vicinity. Local sources of supply are also listed, under PLEXIGLAS, in the classified telephone directories of many cities.

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Please send me:

☐ a copy of your brochure on glazing.

☐ the names of PLEXIGLAS dealers in this area.

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Company.....

Address.....

City..... **Zone**..... **State**.....

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ACCO's Great New Chain...

ACCOLOY X-WELD 125

• *At last*—a chain with welds as strong or stronger than the material . . . welds that won't break when links are bent sharply . . . welds made with two projecting lugs that absolutely prevent dangerous kinking of the chain . . . welds that provide 2¼ times the welded area found in normal flash or butt-welded links. **Accoloy X-Weld 125** Chains hang straight as a die. Every link is perfectly formed!

Accoloy X-Weld 125 Chain has almost countless uses: Slings, bundling, towing, general utility chains . . . It can be furnished in special analyses and heat treatments to provide greatly extended life and use on tough jobs . . . corrosive jobs . . . abrasive jobs . . . hot jobs. Specify **Accoloy X-Weld 125** for your next chain job for a new concept of chain performance, economy and value. Available in ¼", ⅜", ½", ⅝" and ¾" sizes.

• Ask our nearest district office for further information on ACCOLOY X-WELD 125 CHAIN, *or write the American Chain Division, York, Pa., for descriptive bulletin.*

PATENT APPLIED FOR

The Secret is in the Weld!

This Accoloy X-Weld 125 link was ground and etched to show its big welded area —2¼ times the size of welded area possible with other welding processes. This means more than double the security at the weld—and only X-Weld has it!

ACCO

TRADE MARK

American Chain Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn.

for Better Value

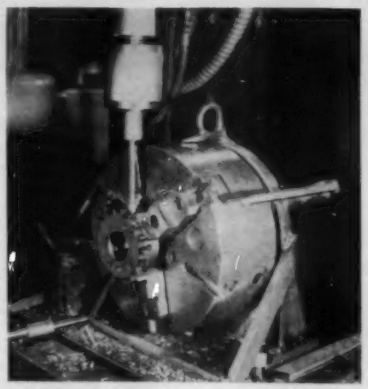
For more facts circle 533 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

the chuck which was fitted with an arm that would lock it in any one of 12 positions. The entire fixture was made of scrap material from the department.

The new fixture allows drilling all the holes in a sprocket before tapping



Modified lathe chuck mounted on drill bed, rotates 360 deg, allows all sprocket holes to be drilled before tapping

them. Only one tool change per sprocket is involved now, while previously, a tool change was necessary for each hole. The new method is approximately 33 per cent faster than the old one and insures uniformity of holes. *From Chain Gang, published by Diamond Chain Company, Indianapolis, Indiana.*

Safety in the Boiler Room

WHEN REMOVING cylinder heads or turbine bonnets from engines during repair operations, the following safety precautions should be observed.

All valves connecting the equipment to any discharge system used in common by the device under repair and other apparatus must be shut. This refers to drip or bleeder valves discharging into a common exhaust line, and/or blow-off valves on boilers discharging into a line connecting two or more boilers.

All valves connecting the equipment or container to a source of supply must be shut.

Where there are connections from the equipment leading directly to atmosphere (such as emergency turbine atmosphere exhausts), such connections must be opened.

After these precautions have been taken, cylinder heads, covers, jackets, bonnets or other closure may be removed only in the following manner:

New Sarco Thermodynamic Steam Trap practically eliminates maintenance!

Only moving part—a hardened Solid Stainless Steel Disc—practically wear-proof!

SOME OF MANY ADVANTAGES

1. Same trap for all loads and pressures 10-600 psi.

2. Closes tight on no load.

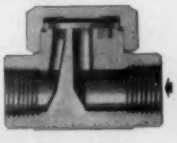
3. Operates against back pressures up to 50% of inlet pressure.

4. Not affected by superheat, water-hammer, vibration, corrosive condensate.

5. Smallest inventory of spare parts.

SIMPLICITY—to the Nth degree!

No valve-closing mechanisms to wear or stick. No critical clearances to choke. No gaskets to leak. Three simple parts...machined from stainless steel bar stock. Only one moving part. What could be simpler?



SARCO COMPANY, INC.

2133-B

Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.

Please send me: ☐ Bulletin 255-44
☐ A Sarco Thermodynamic Steam Trap for 60-day trial. Size_____ for installation on_____

NAME_____

FIRM_____

ADDRESS_____

CITY_____ STATE_____

For more facts circle 534 on Reply Card

Unique turbulent area assures positive dust collection at constant efficiency . . . to the micron range

Here is the "heart" of the Hydro-Filter principle of dust separation. This violently turbulent area of water, bubbles and mist is produced by the countercurrent action of air against water. Constant long contact between the air being cleaned and the water which is doing the cleaning produces a scrubbing action which is positive, thorough and unaffected by variation in volume and velocity of flow. Dust is entrained by any, or all, of three means: (1) Entrapment within falling water droplets; (2) Impingement on bubble surfaces; (3) Impingement on wetted surface of glass spheres.

As the photo indicates, the entire collection area is continually flushed. There are no dead areas to corrode or erode. No moving parts to "load up" and reduce efficiency. Maintenance is a matter of *minutes a month*. Collection of dust to micron size is continuous and sludge removal automatic with the National Hydro-Filter.

Write for Bulletin 55 . . .

See why and how separating efficiencies of up to 98.9% on foundry shakeout dust are possible practical — and continuous with Hydro-Filter!

NATIONAL

Dust Collector Corp.

604 Machinery Hall Bldg., Chicago 6, Illinois

Subsidiary of National Engineering Company, Manufacturer of Simpson Mix-Mullers.

For more facts circle 535 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

When the closure is held by one saddle bolt or stud, as a handhole or cleanout plate on a boiler, slack off the nut or stud slightly and tap the plate carefully to break the gasket loose before the anchoring power of the bolt has been lost.

When the closure is held by two bolts or studs, back both off together as though they were only one bolt.

Where the closure is held by more than two bolts or studs, slack all of them a few turns only. Select two diametrically opposite bolts or studs in the group, or two which are opposite on covers or closures which are not circular, and leave these two bolts in place. (Chalk them for identification.) Proceed with the removal of all other bolts or stud-nuts. After this has been done, attach a crane hook or chain falls cable to remove only that amount of strain about equal to the weight of the closure being removed. This relieves the weight on the two remaining nuts. Next, break the joint between the head, cover or closure and the body.

Men attending to this activity must stand clear and watch for a rush of hot water or steam. When safe removal has been ascertained, the two remaining bolts or stud nuts may be removed and the piece swung clear.

In instances where the head or piece is very large it may be judged desirable to leave more than two bolts in place. With smaller jobs readily handled by hand, cranes or tackle may be dispensed with provided there is no hazard introduced by such omission. This will also be a matter of judgment on the part of the foreman in charge of the job. *From an article by R. R. Taggs, E. E., Jackson, Mich.*

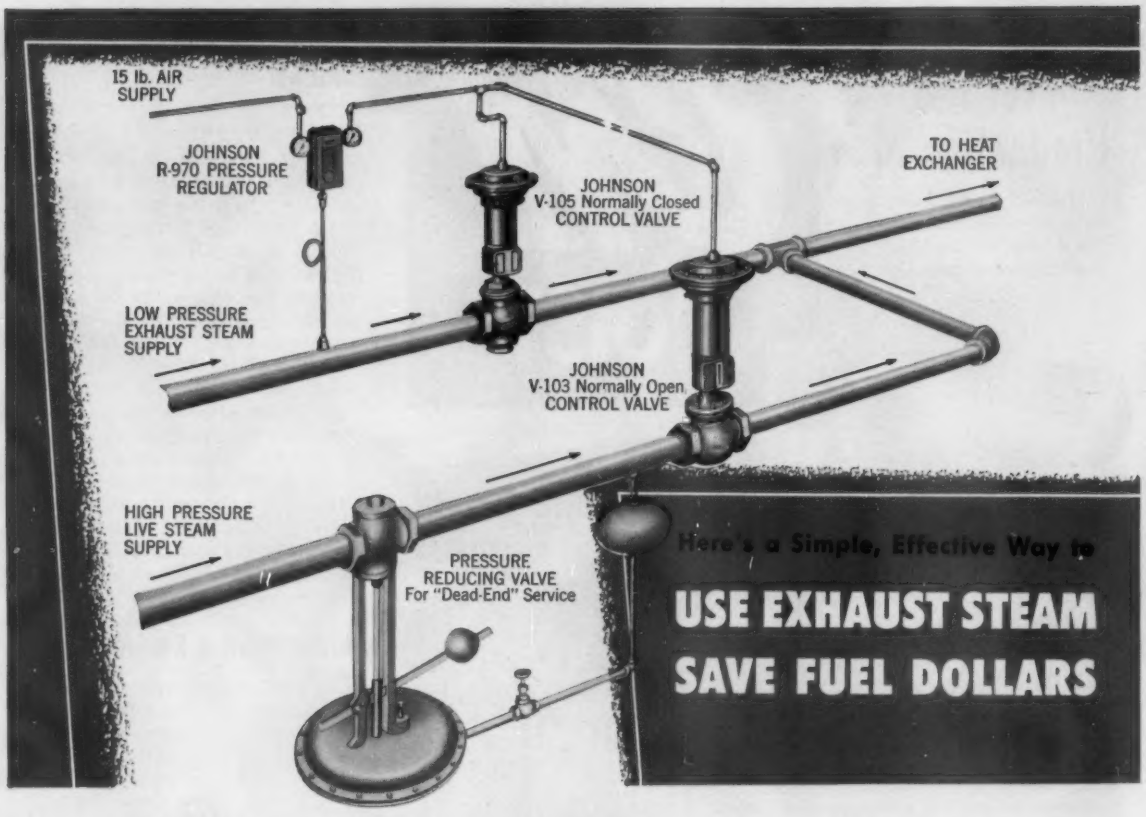
Nitrogen in Steel Making

EVIDENCE IS increasing that nitrogen is a valuable alloying element in developing new steels for jet engines, gas turbines and atomic energy applications.

Knowledge of the effects of nitrogen on steel has been built up over many years, and its application is now taking on significance.

For example, a steel recently developed for strength at extremely high temperatures, was found to be improved for its end use by chemical changes which included increasing the nitrogen content while reducing the amount of another alloy.

In another instance, the presence of


15 lb. AIR SUPPLY
JOHNSON R-970 PRESSURE REGULATOR
JOHNSON V-105 Normally Closed CONTROL VALVE
TO HEAT EXCHANGER
LOW PRESSURE EXHAUST STEAM SUPPLY
JOHNSON V-103 Normally Open CONTROL VALVE
HIGH PRESSURE LIVE STEAM SUPPLY
PRESSURE REDUCING VALVE For "Dead-End" Service
Here's a Simple, Effective Way to
USE EXHAUST STEAM
SAVE FUEL DOLLARS

Change Automatically to Live Steam ONLY When Necessary!

Why use live steam all the time and run up unnecessary costs when, part of the time, economical *exhaust steam* often can do the job just as well? By utilizing exhaust steam whenever possible, you can easily realize substantial fuel savings.

The Johnson Control hookup, illustrated above, overcomes the usual disadvantage of using exhaust steam for heating coils, heat exchangers and other equipment where low pressure steam is required. When the pressure of the exhaust steam drops to a point where it ceases to be useful, the sensitive Johnson R-970 Pressure Regulator automatically closes the Johnson Valve on the exhaust steam supply and opens the Johnson Valve on the live steam supply. A "dead end" reducing valve is set to deliver live steam at proper pressure. It's that simple!

Automatically, without attention of any sort, exhaust steam is used whenever it is available. Live steam is consumed only when it is actually needed. There is no chance for the lack of proper steam pressure to be overlooked.

The nationwide Johnson organization offers you over 70 years' experience in solving every conceivable type of temperature control problem. Whether your special problem involves the application of a single controller or an intricate control system, a Johnson engineer will gladly recommend the best solution without obligation.

Complete engineering, sales, installation and service facilities are readily available from more than 90 direct branch offices.

For more information about the equipment illustrated, mail the coupon today.

JOHNSON CONTROL

TEMPERATURE ⇕ AIR CONDITIONING

PLANNING • MANUFACTURING • INSTALLING • SINCE 1885

JOHNSON SERVICE COMPANY
507-R E. Michigan St., Milwaukee 2, Wisconsin

Please send me your apparatus bulletins describing the following equipment:

- ☐ R-970 Pressure Regulator
- ☐ V-105 Normally Closed Steam Control Valve
- ☐ V-103 Normally Open Steam Control Valve
- ☐ New Condensed Catalog of All Johnson Control Apparatus
- ☐ Have a Johnson engineer call me.

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Practical Idea for the Production Man

Efficient electric hoists...to move materials overhead and release floor space for more valuable operations.

CM HOISTS

CM LODESTAR ELECTRIC CHAIN HOIST
½ to 1 ton capacites—First truly heavy duty version of small electric hoist. ½ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

CM METEOR ELECTRIC WIRE ROPE HOIST
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!

Rugged lightweight hand hoists and pullers...to make your job easier and safer

CM CYCLONE HAND HOIST
½ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER THE "ONE MAN GANG"
½ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation. Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds. CM-Alloy flexible load chain.

ALSO... *CM Trolleys and Cranes*

Call the CM distributor for descriptive literature, prices and fast delivery from stock.

CM HOISTS AND CHAIN

CHISHOLM-MOORE HOIST DIVISION
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For more facts circle 537 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 40)

nitrogen compound in steel was reported to improve the resistance to fracture in very low temperatures.

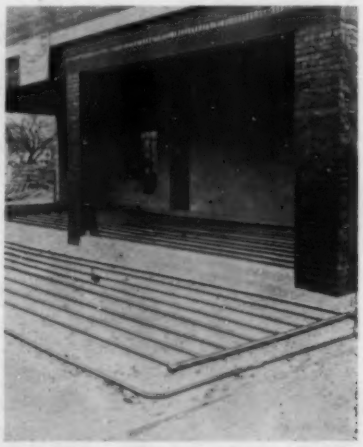
One source of nitrogen in steel is calcium cyanamid, often used in steels for tin plate to increase temper hardness. In some cases, the hardness required in steel to make "tin cans" can be obtained with about half of the rolling needed where lower nitrogen steel is employed.

In some stainless steels, nitrogen helps to refine the grain structure and to maintain a small grain in spite of normally coarsening heat treatments. Nitrogen is also used to promote ductility in certain stainless steels at room temperature. *From Steel Facts, published by American Iron and Steel Institute, New York, N. Y.*

Winter Weather Reminder

IN 1947 a snow melting system was installed beneath the sidewalk outside the Protane Corporation, Erie, Pa. and has operated successfully since.

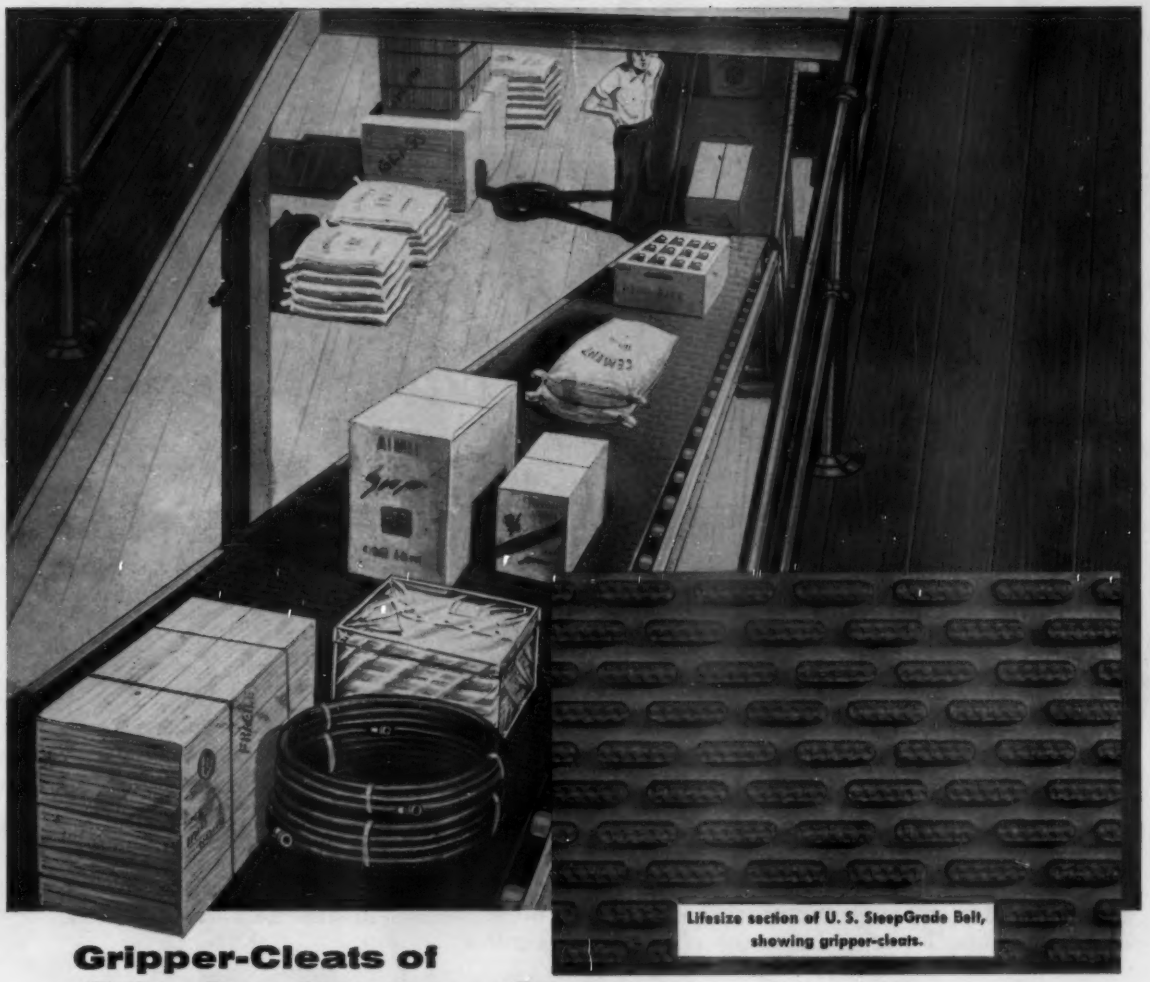
Grids of 1-in. wrought iron pipe on 12-in. centers were embedded in 672



Pipe grids embedded in sidewalk carry hot water to melt snow continuously

sq ft of concrete sidewalk. Water at 130 F, with a permanent type antifreeze additive, serves as the heating medium, circulated from a multi-fin parallel flow Ruud gas water heater. The pilot light of the heater is kept burning all winter.

The system was designed to melt 1 in. of snow per hour. Melted snow does not run off since it evaporates rapidly, leaving the sidewalk free of moisture. *From a release of Ruud Manufacturing Co., Kalamazoo, Mich.*



Lifesize section of U. S. SteepGrade Belt, showing gripper-cleats.

Gripper-Cleats of U. S. STEEPGRADE Provide Non-Slip Package Control on Steep Inclines and Declines

The new, *exclusive* gripper-cleats of the U. S. SteepGrade Belt give positive non-slip control of many materials on ascents or descents as steep as 45 degrees. This feature also saves floor area and belt footage, because the steeper the incline the less floor space occupied. The U. S. SteepGrade Belt is perfect for small buildings.

Note the gripper-cleats in the close-up photo of the belt section. These cleats are *not* attached or cut in; they are *molded*—a true and integral part of the belt. That's why they resist being torn off by heavy cases. The special surface design allows the belt to *clean* itself as it flexes over the pulleys.

This remarkable new belt is obtainable at any of the 27 "U. S." District Sales Offices or by writing address below.

"U. S." Research perfects it . . . "U. S." Production builds it . . . U. S. Industry depends on it.

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Hose • Belting • Expansion Joints • Rubber-to-metal Products • Oil Field Specialties • Plastic Pipe and Fittings • Grinding Wheels • Packings • Tapes
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ATLAS VALVES

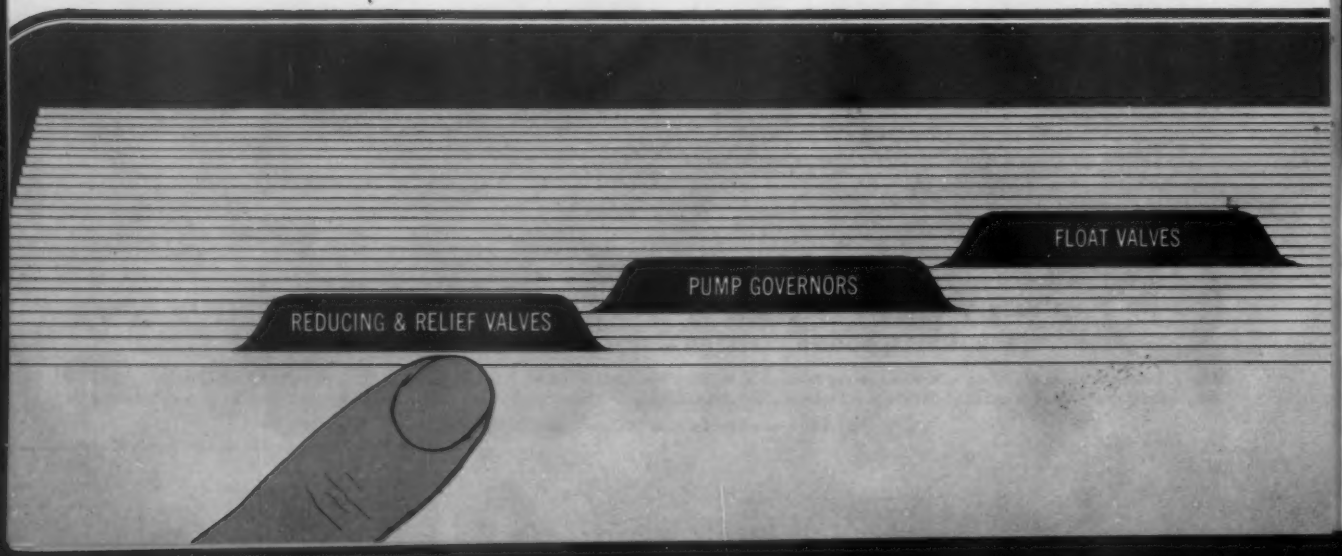
the answer to all your regulating valve problems

for QUALITY • RELIABILITY LOWER MAINTENANCE COSTS

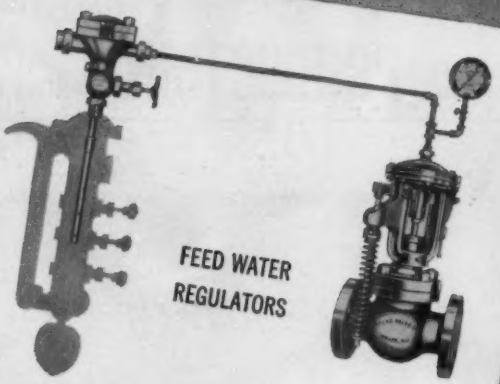
Here is industry's most comprehensive line of automatic regulating devices for heating, power generation and industrial processes . . . backed by nearly 60 years of development and manufacture of valves and controls *exclusively*. When you specify Atlas valves, you are assuring greater efficiency, more economical operation, longer life, lower maintenance costs and a standardization of valve parts providing maximum interchangeability.

Quality-controlled manufacture . . . an iron-clad guarantee . . . and a policy of staying with a job until it is working the way *you* want it—these are the factors that have made the name of Atlas outstanding in the field of automatic control.

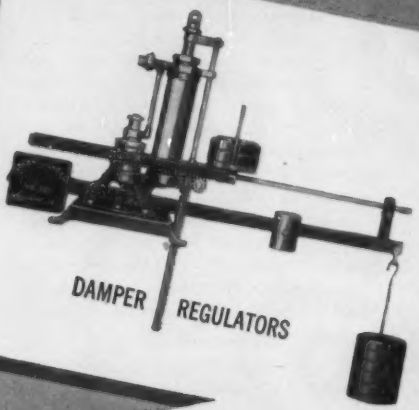
CUSTOM ENGINEERING: Every order gets special attention at Atlas to be certain that the right valve is selected to fit your requirements. If necessary, special valves can be custom-engineered from standard Atlas parts to meet unusual operating conditions . . . or Atlas engineers will be glad to work with you in designing a completely new valve to meet your regulating and control problems.



REDUCING & RELIEF VALVES

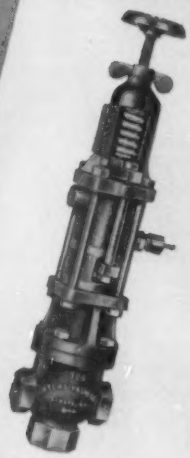


FEED WATER REGULATORS

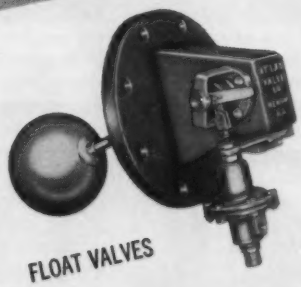


DAMPER REGULATORS

TEMPERATURE REGULATORS



PUMP GOVERNORS



FLOAT VALVES

The Atlas line covers a wide choice of standard valve types and mechanisms without confusing duplication, making proper selection of the right valve for your job a relatively simple matter. Shown above are typical designs of the many reducing valves, pump governors, relief valves, temperature regulators, float valves, damper regulators, combustion control valves and boiler feedwater regulators that are available in sizes, styles and constructions to meet every requirement.

For more complete information on Atlas valves, write for Bulletins 36G and 37R, or ask your local Atlas representative.

CUSTOM ENGINEERING

FEED WATER REGULATORS

TEMPERATURE REGULATORS

DAMPER REGULATORS

ATLAS
VALVE COMPANY

280-284 SOUTH STREET, NEWARK, N. J.

REPRESENTATIVES IN PRINCIPAL U.S. CITIES AND IN CANADA

OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

Sound Barrier Fits Around the Job

TESTS CONDUCTED in a foundry chipping department with a new noise control product of the Bemis Bro. Bag Co., the TransWall Curtain, show a significant reduction of 15 decibels in the noise level around the chipper.

From a starting noise level of 104 decibels, the curtain wall surrounding the chipping operation reduced the level to 89 decibels, with all readings being taken at a distance of six feet from the chipping hammer.

These values represent a change from a noise level that may affect the comfort of workers to a level that is believed safe in all frequencies of the noise spectrum. Direct gains are: Increased worker comfort, greater efficiency in communication, fewer errors and less accumulated irritation at the end of the workday.

Also, the TransWall curtains are retractable, and may be easily opened for material movement or for complete accessibility to a machine or process.

Test unit of sound barrier curtain installed to enclose grinding operation

The principle evidenced by the use of these curtains is that a light weight acoustic material possesses sufficient resistance to the passage of sound to make it a good sound barrier, particularly if it has other qualities not possessed by permanent sound barriers, such as retractability, ease of installation and mobility.

Hosiery Plant Cools Off

AIR CONDITIONING the plant of Hardy & Son, Inc., in Pulaski, Tennessee, has produced a 29 per cent increase in the plant's production of ladies' full-fashioned nylon hosiery.

Company officials state that the air conditioning installation facilitated the reduction of the workday length and the elimination of Saturday and other overtime work. Because of increased seaming and finishing production, employees can keep up with the long rows of delicate 54-gage knitting machines in the shorter work period.

Another big saving has resulted from the decrease in machinery maintenance required. The knitting machines, while 57 ft long, have needles with only 0.002 in. clearance, and a

(Continued on page 56)

U.S. Naval Shipyard Improves Processes for Gate Valve Machining

GATE VALVE machining has become a high-production operation at the San Francisco Naval Shipyard, as reported in the Bureau of Ships Journal.

Machining involves both body and gate of the valves, and the first step is taken on the body flanges to make them parallel with one another and equidistant from the guide center. Hook jaws on the chuck hold the body flush against the chuck face.

Next, the valve body is threaded for false seats. A five-degree adapter is installed between the lathe spindle and the hookjaw chuck. The body is then threaded to a predetermined plug gage size, removed from the lathe and fitted with false seats.

The gate machining process follows next: 1. A center hole is countersunk on both ends of the gate for aligning purposes. 2. The gate is threaded to suit either a plug gage or the existing stem. 3. The gate is milled and slotted while lined up between centers and held in place by self-aligning jaws on the milling machine. 4. The last and most important step involves machining the gate to fit the body. A special two-jaw chuck with independently operating jaws is mounted on a five-degree adapter on the lathe spindle. The gate is finished slightly oversize, is blued, and then tried for fit. Eccentric mounting adjustments on the chuck permit alignment of the gate and the seat. After the alignment is complete, a final cut is taken on both faces, to seat the gate.

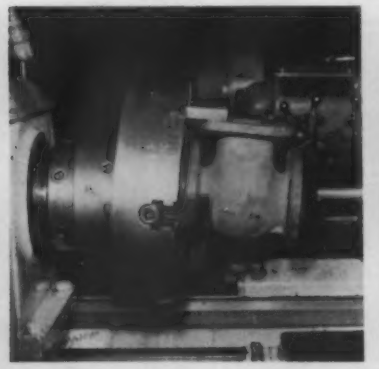


Fig. 1. Valve body angled by five degree adapter fitted on lathe spindle

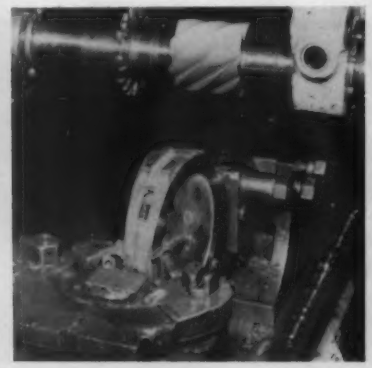
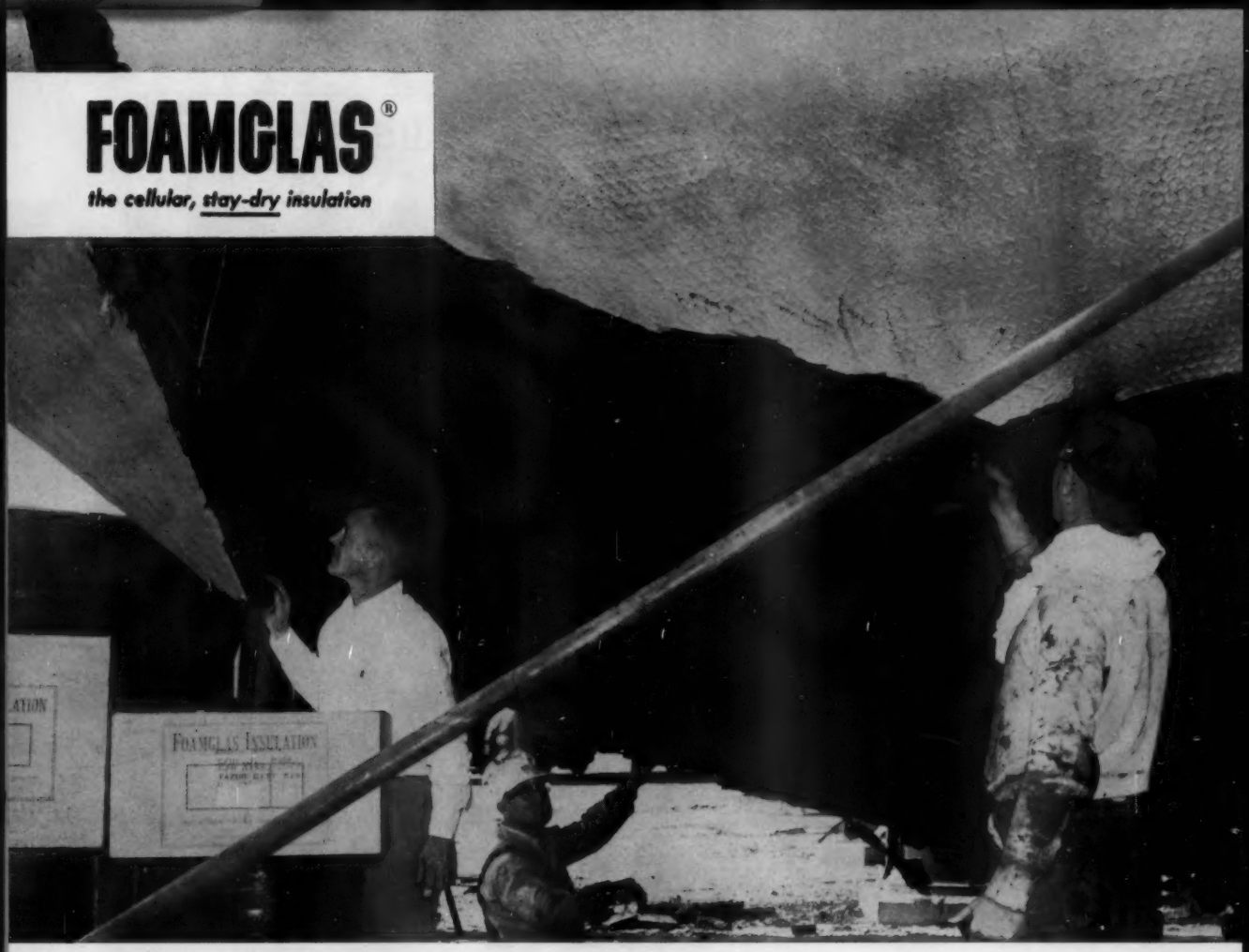


Fig. 2. Self-aligning jaws hold gate in place for milling and slotting cuts

Fig. 3. Valve gate held in two-jaw chuck and adapter for final face cut

FOAMGLAS®

the cellular, stay-dry insulation



Mississippi Chemical Corporation reports . . .

"Long-lasting, stay-dry FOAMGLAS replaced failed organic insulation on our ammonia storage sphere"

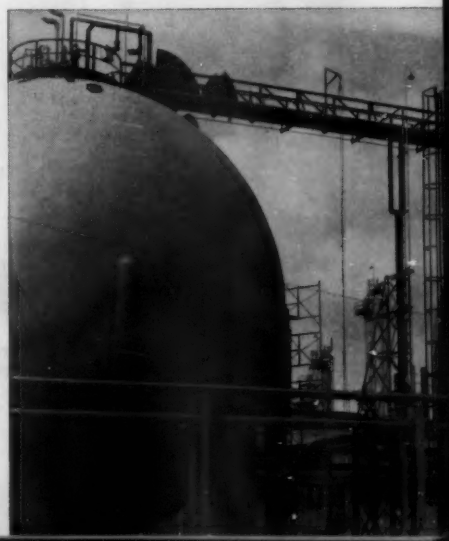
Organic insulation on a 34°F. ammonia storage sphere failed in less than 4 years . . . so Mississippi Chemical Corporation replaced it with long-lasting, *stay-dry* FOAMGLAS. William B. Dunwoody, General Operations Manager at Mississippi's Yazoo City plant says:

"Moisture penetration and migration ruined the original organic insulation. We had to find a truly waterproof insulation to replace it. We picked FOAMGLAS because we know its sealed glass cells simply can't absorb or transmit moisture in any form.

"We reinsulated the 48 ft. diameter sphere in sections in order to keep it in continuous operation. As each section of failed insulation was removed, it was immediately replaced with FOAMGLAS. That meant that the new insulation had to be stored in the open nearby —and it rained nearly half the time the work was going on. Pouring rain never harmed the FOAMGLAS . . . proving to us that this remarkable insulation *is* completely waterproof. We're sure that it will give us long-lasting, dependable insulating performance without costly maintenance and repair," concludes Mr. Dunwoody.

Let Mississippi Chemical's experience be *your* guide to constant, highly efficient insulating performance with *stay-dry* FOAMGLAS. This unique cellular glass insulation is completely inorganic, cannot rot or deteriorate. It is fireproof and acid-proof. It will give you the maintenance-free insulating performance you need for your piping, tanks, spheres and other industrial equipment. Why not send today for a sample and our detailed, descriptive literature.

Mississippi Chemical avoided a costly shutdown of this ammonia storage sphere by reinsulating it in sections. As each section of the old, watersoaked insulation was removed, it was immediately replaced by waterproof blocks of FOAMGLAS. Insulation Contractor was North Brothers, Birmingham, Alabama.



Pittsburgh Corning Corporation

Dept. PE-95, One Gateway Center
Pittsburgh 22, Pennsylvania
In Canada: 57 Bloor St. W., Toronto, Ontario

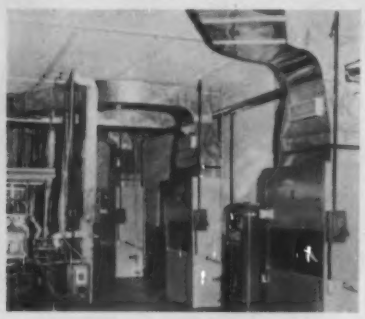
For more facts circle 540 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

3 deg variation in temperature or a 3 per cent variation in humidity will cause expansion or contraction sufficient to cause machine jamming.

It was formerly necessary to have maintenance men available on all three shifts, constantly adjusting the machines. Maintenance costs have dropped 80 per cent, and the usual semi-annual cleaning of the machines is no longer necessary, because filtered air is being provided by the conditioning units.



Air conditioning units were installed at one end of machine room with air ducts reaching to the far end

The hosiery plant's system consists of four Chrysler Airtemp 15-ton packaged water-cooled units, tied into two duct systems that extend the entire length of the plant. The same ductwork is used for heating. Two of the units—one on each duct system—are controlled by both a thermostat and a humidistat, to permit removal of moisture during the "in-between" seasons. Reheat is used to control temperatures under these conditions, and moisture is added, when needed, with a spray type humidifier.

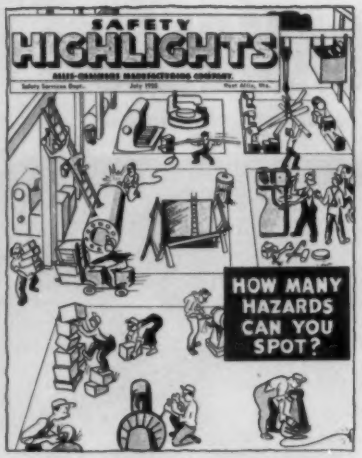
Booklet Sparks Safety Program

A FOUR PAGE, 6½-in. by 8½-in. leaflet is being used successfully by Allis-Chalmers Safety Services Department to alert employees in the company's West Allis and Hawley Works to safe procedures in the shop and off the job.

One feature of the leaflet is a quiz game. This usually consists of five questions with the answers to them appearing in the same issue. These questions vary from "How far from the wall should you place the base of a ladder so that it will be at a safe angle?" to "What six things should be checked after mounting a new pedestal grinding wheel?"

Each issue of "Safety Highlights" also usually includes a question which applies directly to Allis-Chalmers shop activities. Examples are such queries as "What per cent of the injuries in our plant are caused by employes falling or bumping into something?" and "What is the speed limit for vehicles on company property?"

Besides the direct question and answer approach, the quiz utilizes pictures from time to time, similar to the cover illustrated.



Reproduction of booklet cover shows how the picture quiz is undertaken

Graphs and curves are part of each issue. Regularly a comparative graph of frequency rates by divisions is published for the two preceding months, together with a listing of departments with no accident frequency for the preceding month.

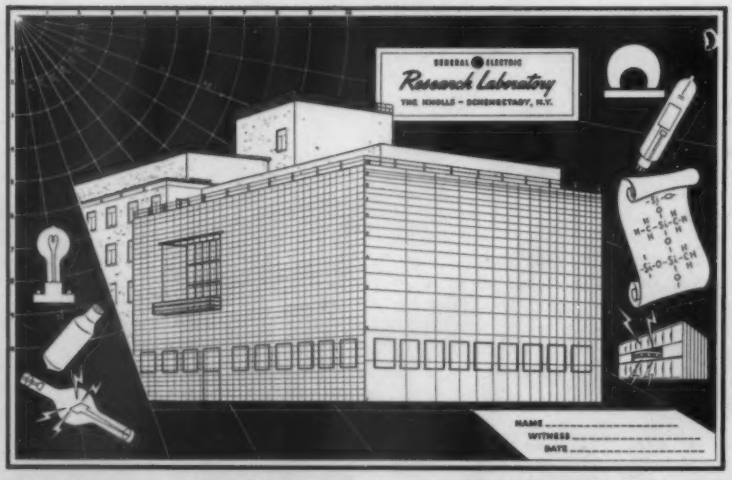
Some 1200 copies of "Safety Highlights" are printed each month for distribution to shop supervisory employes, and about every three months, the leaflet is designed for general employe readership and additional copies are printed for general distribution through literature racks located throughout the plant.

Truck Batteries to the Rescue

EMERGENCY NEEDS have prompted several ingenious uses for the storage batteries in the industrial trucks at the plant of the E. W. Bliss Company, Canton, Ohio. As reported by field engineers of Gould-National Batteries, Inc., in the event of a power failure, special flood lights are placed in brackets on the trucks and plugged into the truck battery. The lights used are 200 watt, sealed-beam, locomotive headlights adapted for use on 36 volt current. Six lights are available at all times at the truck charging station and two are placed in each of the four production buildings. Strong, steady light can be made available anywhere in the plant or grounds that an industrial truck can reach. These lights have been used three times in three years under emergency conditions.

In an emergency, industrial truck batteries can also furnish power to the plant telephone system, through a special connection. The regular standby batteries will power the telephone system for three hours. At the end of this time, if necessary, a fork-lift truck

No Rest for the Research Engineer, Even at Lunch!



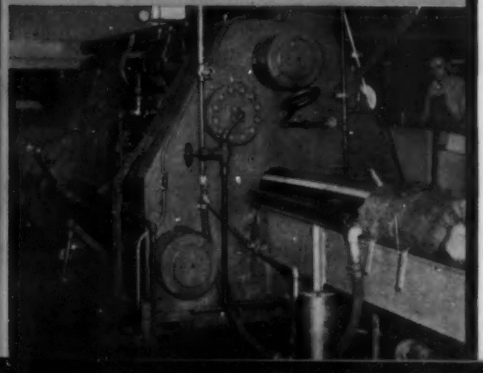
Cafeteria placemats, too, are conducive to progress at General Electric's Research Lab near Schenectady, N. Y. Cross-section lines, log-log ruling and protractor are included in design. Signature line permits idea-dating and witnessing

STANOIL
INDUSTRIAL OIL

does heavy chores for
Light Metals Corporation

Tool Room Superintendent Max Chase (left) and Production Engineer Peter Van Dyke (right) with Standard lubrication specialist R. T. Cleland inspect frame of extruded aluminum. Bob Cleland, a graduate of Michigan State with a B.S. in Mechanical Engineering and of Standard's Sales Engineering School, has the background to provide customers with competent technical service on their lubrication problems. This training and experience, customers have found, pay off *for them.*

Light Metals Corporation uses this 1,250 ton Hydropress for extrusion of aluminum shapes for aircraft, automotive and major appliance industries. Press operates at 2,840 psi in the hydraulic system. Hydraulic medium is STANOIL.



Three years ago Light Metals Corporation, Grand Rapids, put their 1,250 ton Hydropress into operation. The initial fill for the hydraulic system was STANOIL Industrial Oil. The press has operated continuously since its start up. There is no evidence of deposits or varnish anywhere in the hydraulic system. Light Metals Corporation looks forward to many more years of such trouble-free operation.

Why was STANOIL ordered by Light Metals for their Hydropress? The answer is found in the service STANOIL has given in other equipment. Back in 1948 when a Watson-Stillman extrusion press went into operation for Light Metals, STANOIL was chosen as the hydraulic oil. As with the Hydropress, STANOIL has a perfect performance record. The Watson-Stillman press has operated seven years without shutdown because of hydraulic fluid failure.

This kind of service from a hydraulic oil means Light Metals Corporation can turn out extruded aluminum shapes for the aircraft, automotive and major appliance industries with high performance and low maintenance factors that mean bigger profits. Reason enough for relying on STANOIL.

STANOIL Industrial Oil can perform for you just as it is doing for Light Metals Corporation. In the Midwest a lubrication specialist from your nearby Standard Oil office will explain how. Call him. Or contact Standard Oil Company, 910 S. Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY
(Indiana)

STANDARD

For more facts circle 541 on Reply Card

The ARCHITECT knows that

ALGRIP

the *only* abrasive rolled steel floor plate in the world—means utmost safety against slipping accidents in any industrial plant . . . even on wet, greasy or oil-splashed floors or ramps.

He also knows . . .

—that ALGRIP's depth-controlled abrasive penetration of its rolled steel base . . . assuring a safety surface self-renewed against the hardest wear . . . means greater . . . constant . . . and lasting . . . safety of your workers' lives.

—that ALGRIP is approved for safety by the Underwriters' Laboratories.

A.W. ALGRIP Abrasive Rolled Steel Floor Plate *puts your business on a firm footing.*

A.W. ALGRIP ABRASIVE ROLLED STEEL FLOOR PLATE

ALGRIP—*Approved for Safety by Underwriters' Laboratories.*

ALAN WOOD STEEL COMPANY
Conshohocken, Pa.

Please send A.W. ALGRIP Booklet AL-30

Name_____

Title_____

Company_____

Address_____

City_____ Zone_____ State_____

Other products: A.W. SUPER-DIAMOND Rolled Steel Floor Plate—Plates—Sheets—Strip—(Alloy and Special Grades)

For more facts circle 542 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

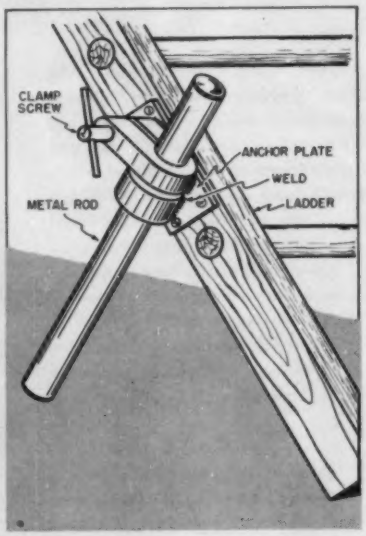
is driven to the telephone room, plugged into the system to permit communications for several more hours.

Occasionally the inter-building diesel locomotive requires more time to start than can be supplied by the regular diesel starting batteries in the locomotive. A fork-lift truck is parked alongside the locomotive, the truck battery is plugged into the diesel starting system. The battery can furnish the extra ampere-hours needed in cold weather, for example, or when the locomotive does not operate enough to keep its battery charged.

Extra "Feet" for Ladders

LADDER SLIPPAGE can be offset considerably by fitting an anchoring device to each leg, the device being basically a metal rod which forms a strut that can be adjusted to the slope of the ladder.

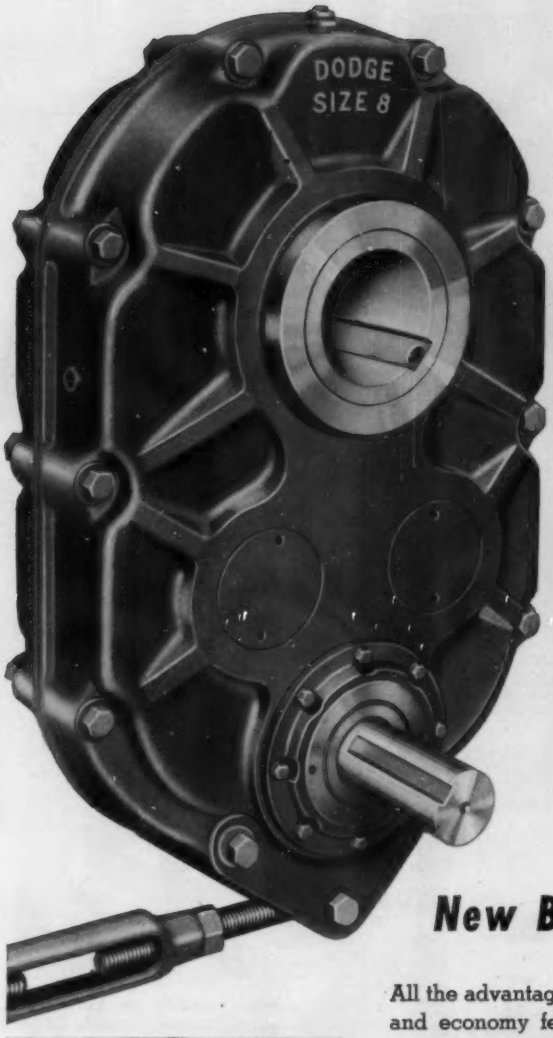
To construct the safety anchor, a plate is secured to each leg with four



Drawing illustrates construction and installation of non-slip strut on ladder

wood screws, and to it is welded a short length of heavy gage steel tube. The tube is then divided into two sections by a saw cut. The upper half is split longitudinally, a lug is welded on each half, drilled and tapped and a T-head screw inserted. The split tube can then be closed and clamped on the strut by tightening the screw. The lower section of the tube acts as a support and guide.

In use, the ladder is leaned against



NOW!

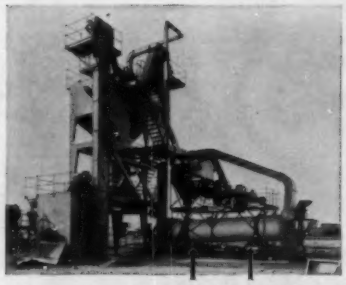
60 H.P. DODGE TORQUE-ARM SPEED REDUCER

New Big Size! New Big Savings!

All the advantages of shaft-mounting . . . all the proven performance and economy features of Dodge Torque-Arm Speed Reducers . . . are now available for your *big* jobs. The husky new size No. 8, in the double reduction series, has a capacity of 60 hp at 100 rpm, AGMA rating, and can be mounted on shafts up to 5-inch diameter.

The new No. 8 has all the inherent advantages of the Dodge Torque-Arm line. No foundation, no flexible couplings, no sliding base required—and there are no lining up difficulties. It is mounted directly on the shaft. The torque-arm, fastened to any fixed object, anchors the reducer. The unit is driven through any V-belt drive. Stock Taper-Lock Sheaves permit any speed ratio desired.

Another new member of the Torque-Arm line is the single reduction No. 11 (1.3 hp at 100 rpm, AGMA rating). Torque-Arm Reducers are now supplied, in both single and double reduction series, with capacities from 1 to 60 hp, output speeds from 12 to 365 rpm. For details write for special Bulletin.



Torque-Arm Speed Reducers driving the trunnions rotating an asphalt kiln.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

DODGE MANUFACTURING CORPORATION, 2700 Union St., Mishawaka, Ind.

DODGE
of Mishawaka, Ind.

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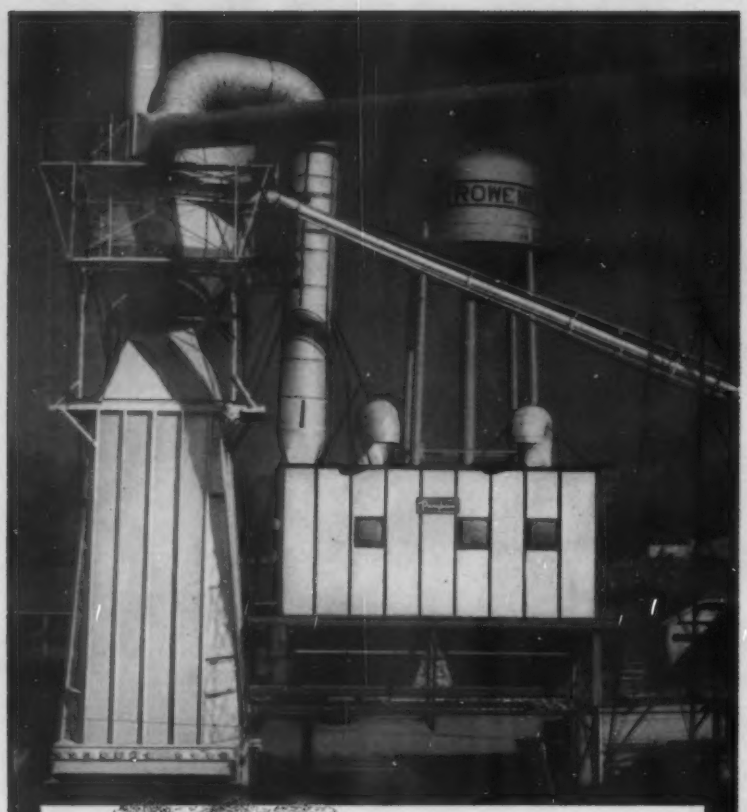


Dust makes it "hot" for Rowe!

Pangborn Dust Control saves Rowe over $12,000 a year in heating costs

Dust used to "make it hot" for Rowe Manufacturing Co., Galesburg, Ill., by posing a serious problem. Rowe, a large producer of wood products (like the Ro-Way garage door), was troubled by the great volume of dust created by its many woodworking operations. Today dust makes it hot for Rowe in a different way! Thanks to Pangborn Dust Control, collected dust now fuels the boilers that provide steam for power and heat. The dust collected by Pangborn Dust Control saves Rowe over $12,000 in heating costs annually! In addition, Pangborn has improved community relations, employee relations and plant cleanliness.

Pangborn can solve *your* dust problem. Pangborn engineers will be glad to show you how Pangborn Dry or Wet Dust Collectors can save you time, trouble and money!

See how Pangborn benefits varied industries. Write for free copy of "Out of the Realm of Dust." Pangborn Corp., 3200 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn
CONTROLS DUST

For more facts circle 544 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

the wall and each clamp screw is loosened so the strut drops and makes contact with the ground or floor; the struts are then clamped firmly. With the struts and ladder legs both bearing on the supporting floor or ground, the ladder will not slip, even on linoleum or other polished surface.

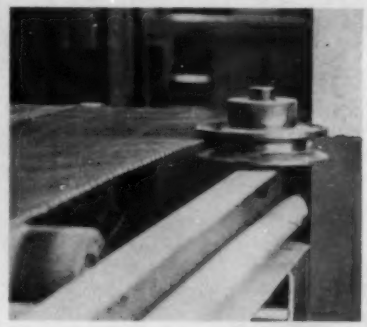
The ends of the struts can be pointed or rounded, and to prevent damage to finished floors, they can be fitted with rubber tips.

Edge Guard for Wire Conveyors

Contributed by J. P. Marshall

EDGES of wire mesh conveyor belts are easily damaged if allowed to rub against any supporting member.

Excellent edge guides may be easily made by mounting small, stock-size



V-belt sheave mounted on horizontal conveyor frame member guards edges

V-belt pulleys on studs, at strategic points. These rotating guides should be placed just ahead of any danger point, just before a drop in level, or before passing over a return drum.

To insure easy rotation and minimum drag, the pulleys should be mounted with light duty ball-bearings.

Turret Lathe Adapted For Angular Cutting

AN INGENIOUS turret lathe machining device permits angular cutting on the face of a bilge pump impeller, at Food Machinery and Chemical Corporation's Ordnance Div., San Jose, California. The device has increased production 50 per cent, while virtually eliminating breakage caused by the former facing method using a sciving tool.

Principle behind the method is a roller-follower mounted opposite the cutting tool on the cross slide. Leav-

Yarway High Pressure Boiler Water Gage with separated-design flat glass inserts. Write for Yarway Bulletin WG-1812.

HE'S A SPECIALIST ON STAINLESS STEEL INLAYS

● A dentist? No.

He's a Yarway craftsman. In the picture above he is milling a gasket groove in the stainless steel facing that is used for this important part of a high pressure boiler water gage body.

The man is important; so is the inlay.

The man is typical of the skilled workmanship that goes into every Yarway gage, blow-off valve, steam trap or other product —workmanship that makes no compromise with quality.

The stainless steel facing is typical of advanced Yarway engineering design. That inlay is but one of twelve basic improvements made in Yarway high pressure water gages.

When buying boiler water gages as well as other steam plant equipment, measure the cost in terms of good engineering, quality, workmanship, and dependable service.

"Make Yarway your way."

YARNALL-WARING COMPANY
145 Mermaid Avenue, Philadelphia 18, Pa.
Branch Offices in Principal Cities

YARWAY

steam plant equipment

BLOW-OFF VALVES
WATER COLUMNS AND GAGES
REMOTE LIQUID LEVEL INDICATORS
EXPANSION JOINTS
DIGESTER VALVES
STEAM TRAPS
STRAINERS
SPRAY NOZZLES

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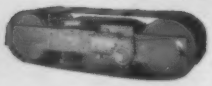
You can INCREASE PRODUCTION
and CUT COSTS
with these DINGS
MAGNETIC PRODUCTS

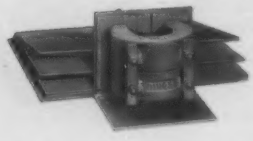


NEW DINGS RECTANGULAR SUSPENDED MAGNET

For pulling iron from fastest belts, deepest burdens, here's the mightiest member of Dings force—RM models available to pull iron through 30 inch air gap. New Dings RM uses less current, weighs less in proportion to strength—design takes less room, dissipates heat faster. Write for bulletin on the most powerful rectangular magnet yet.

DINGS MAGNETIC PULLEYS

Here's perfect low cost iron removal for normal belt burdens. Dings electric or non-electric Alnico pulleys—strongest you can buy—hold magnetics in an iron grip, discharge them separately. Ask for catalog.



DINGS MAGNETIC SHEET FLOATERS

Put a stack of steel blanks in a Dings Sheet Floater and magnetic force fans them out so they're easily grasped. Users have found these units pay for themselves in 2-3 months' time, through increased output. Send for catalog.

DINGS MAGNETIC COOLANT SEPARATORS

Keep coolant free of abrasive particles, prevent pieces from being scratched and wheels from clogging. Tools stay sharper and there's less wear and tear on machines and parts. Write for Coolant Separator Bulletin.

DINGS MAGNETIC SEPARATOR CO.
4766 W. Electric Ave., Milwaukee 46, Wis.

Dings

Dings Magnetic Separator Co.
4766 W. Electric Ave., Milwaukee 46, Wis.
Dings: Send me Catalog containing full information on:

☐ RM Magnets ☐ Pulleys ☐ Sheet Floaters ☐ Coolant Separators

NAME_____
COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

MW155-3/5

For more facts circle 546 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 54)

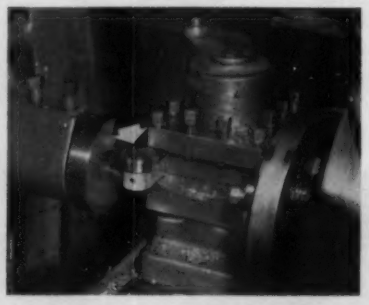


Fig. 1. Roller (arrow) rides against concave disc to guide "floating" slide

Fig. 2. Impeller is machined with six-degree angle on face by lathe device

ing the slide unlocked allows the proper cutting angle to be determined by the pressure of the roller-follower as it travels across a concave cam-disc locked in the turret.

The pump impeller, made from a phosphor-bronze casting, is machined to a tolerance of 0.0015 in. with a six-degree angle on the face.

Cafeteria Cold Spot

A REFRIGERATED "plate," measuring 101 in. by 26 in. by 2¼ in., is a cafeteria innovation at the new Louisville plant of the Ford Motor Company.

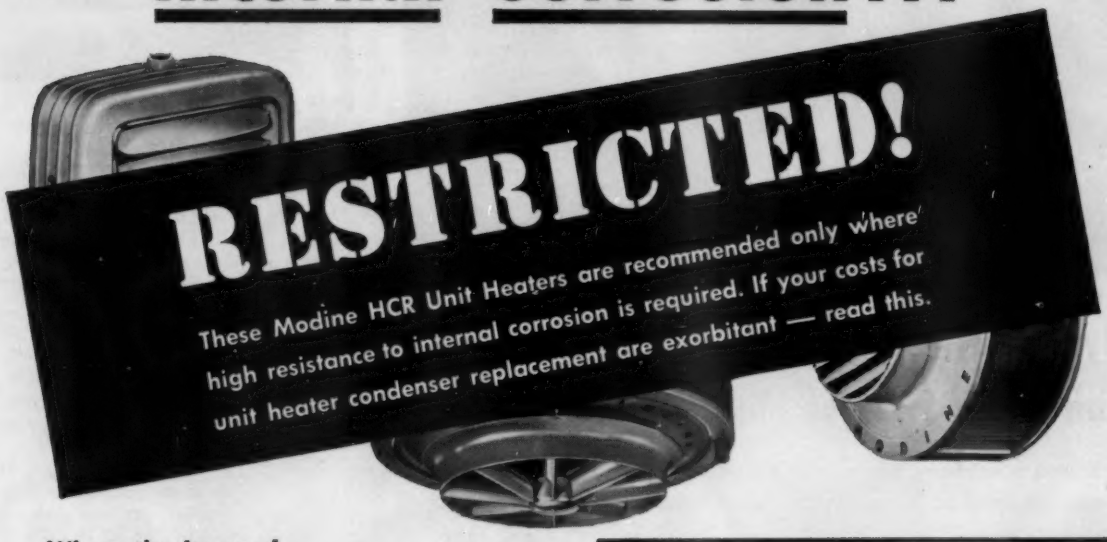
Similar to an ordinary household refrigerator in that it employs the standard refrigeration cycle and equipment, the outstanding difference in the two is the lack of insulation around the cold section of the unit. Salad dishes and butter plates are merely laid on the plate and are cooled by contact.

Compressor units for the plate are mounted remotely and refrigeration lines are run approximately 100 ft from a central compressor room to the unit. Electrical controls are mounted adjacent to the plate for easy access and operation by cafeteria personnel.

Stainless steel throughout, the panel

Announcing—
new lightweight unit heaters with . . .

extraordinary resistance to internal corrosion...


RESTRICTED!
These Modine HCR Unit Heaters are recommended only where high resistance to internal corrosion is required. If your costs for unit heater condenser replacement are exorbitant — read this.

Where they're used

Specially designed Modine HCR unit heaters find ready, cost-cutting application in industrial plants where severe internal corrosion has been causing frequent, expensive replacement of unit heater condensers, steam trap elements and condensate return lines.

Why they're different

While retaining the light weight, compactness and top performance you get with standard Modines, HCR unit heaters offer many premium features. They include special corrosion-resistant alloy condenser tubes . . . special condenser coatings . . . doubly-protected casings. In seven years of rugged field testing — not one Modine HCR unit has failed! That's why HCR's carry *triple* the *standard Modine guarantee!*

How many sizes are available

HCR Unit Heaters are available in 12 horizontal, 16 vertical, 10 power throw models. Capacities range from 82,800 BTU to 616,000 BTU. Most models are available from factory stock for shipment within 30 days on receipt of order.

Liberal exchange policy on old unit heaters

To help you take immediate advantage of all the benefits offered by HCR models, Modine has established a liberal trade-in plan. It provides for exchange of old heaters for new Modines at a favorable trade-in allowance. Plan applies to HCR and standard models.

SU-1285

For complete details, contact the Modine representative listed in your classified phone book or write — Modine Mfg. Co., 1563 DeKoven Ave., Racine, Wisconsin

Modine
UNIT HEATERS

For more facts circle 547 on Reply Card

POLYPENCO® NYLON SHAPES

Nylon Parts Machined in Your Own Shop Can End a Host of Maintenance Problems

• Now it is economically possible to use nylon repair parts that last longer . . . need no lubrication . . . don't score contacting surfaces . . . and put an end to backlash, noise or corrosion. All it takes is POLYPENCO nylon rod, tubing, strip or slab plus the metalworking tools in your own shop. From these stock shapes, it's easy to make gears, bearings, bushings, cams, rollers and many other parts. Since expensive molding dies are eliminated, you can make one part or hundreds with the same economy. You also get these advantages:

- Easy machining—no special operator training or skill required
- Technical help in using and fabricating POLYPENCO nylon shapes
- Immediate warehouse delivery of most standard sizes
- Uniform high quality in every piece

Write for information on the use of POLYPENCO nylon shapes to solve your problems.

The POLYMER CORPORATION of Penna. • Reading, Penna.
In Canada: Polypenco, Inc., 2052 St. Catherine, W. Montreal, P.Q.

POLYPENCO® NYLON
... teflon* and other non-metallics

Warehouse stocks: Boston • Buffalo • Chicago • Cleveland • Dayton • Detroit Los Angeles • Minneapolis • Montreal • New Haven • Reading • St. Louis • Toronto
*trademark for DuPont tetrafluoroethylene resin

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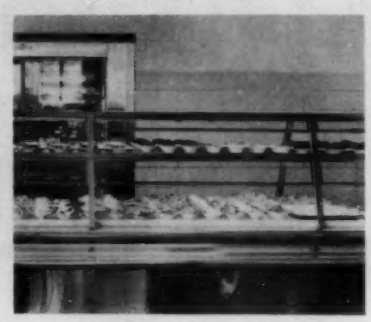
OPERATION—PRODUCTION

(O and P begins on page 54)



Cold plate in cafeteria line at Ford is this non-insulated refrigerated panel

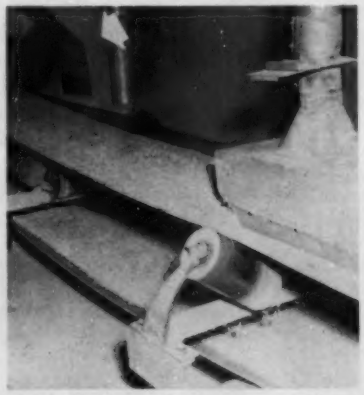
is insulated from the storage spaces beneath it with cork and fiber glass. Drain outlet for the counter and the expansion valve for the refrigeration section are located below the counter.

Belt with a Two-Way Carry

A RUBBER conveyor belt does double duty in a rice drier at Lonoke, Arkansas, operated by the Arkansas Rice Growers Cooperative Association.

Rice rides both top and bottom strands of the same belt, moving in opposite directions. As the belt is loaded on top and bottom through a special arrangement of spouts, the upper strand of the 24-in. wide belt conveys rice from storage bins to a loading point, while the lower strand moves rice to a bucket conveyor which raises the grain to the top of a 10-story drier.

The belt, manufactured by the Industrial Products Division of B. F. Goodrich Co., has a cover of abrasion-resistant rubber on carrying surfaces.



Chute (arrow) feeds bottom strand of belt, as chute at right feeds top strand

Wherever you look AT THE MACHINE TOOL SHOW YOU'LL FIND

BLISS
E. W. Bliss Company
BOOTH #1414

BRYANT
Bryant Chucking Grinder Company — BOOTH #1015

CMC CLEARING USI
Clearing Machine Corp.
BOOTH #716

CLEVELAND
The Cleveland Automatic Machine Co. — BOOTH #412

CONSOLIDATED MACHINE TOOLS
Consolidated Machine Tool Co. — BOOTH #217

EDLUND
Edlund Machine Co.
BOOTH #115

famco
Famco Machine Company
BOOTH #507

FEDERAL PRESS
Federal Press Company
BOOTH #801

FOSDICK
The Fosdick Machine Tool Co.
BOOTH #1402

FOX
Fox Engineering Company
BOOTH #419

GALLMEYER & LIVINGSTON
Gallmeyer & Livingston Company — BOOTH #906

GREAVES
Greaves Machine Tool Co.
BOOTH #721

speeds installation of any machinery protects accuracy of precision machines

These machine tool builders cut set-up time at the Machine Tool Show from hours to minutes with BARRYMOUNT® Leveling Isolators. No drilling floors, no setting lag bolts, no shimming — they just set their machines on the Barry mounts, adjusted the leveling screws, and the normally tedious, costly job was done.

This is not just a show trick — it's a standard efficiency procedure for new installations and re-installations in large and small plants all over the country. And, *at the show or in your plant,* the isolation built into Barry mounts protects precision machines against vibration from nearby heavy equipment.

Visit us at Booth 153, Production Engineering Show, and a Barry engineer will show you how *you* can simplify installation, protect machine accuracy, prolong machine life, and cut maintenance costs with Barry Machine Mounts.

BARRY CONTROLS
INCORPORATED
910 PLEASANT STREET WATERTOWN 72, MASS.
SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

JOHNSON
Johnston Machine & Press Corp.— BOOTH #411

KINGSBURY
Kingsbury Machine Tool Corp.
BOOTH #915

PRECISION PRODUCTION THROUGH MICROHONING
MICRO MATIC
Micromatic Hone Corporation
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Moline Tool Company
BOOTH #1304

Monarch TURNING MACHINES
The Monarch Machine Tool Co.
BOOTH #920

THE MOTCH & MERRYWEATHER MACHINERY CO
The Motch & Merryweather Machinery Co.—BOOTH #606

Onsrud®
Onsrud Machine Works Inc.
BOOTH #812

RACINE
Racine Hydraulics & Machinery Inc.
BOOTH #102

SHEFFIELD
The Sheffield Corporation
BOOTH #1305

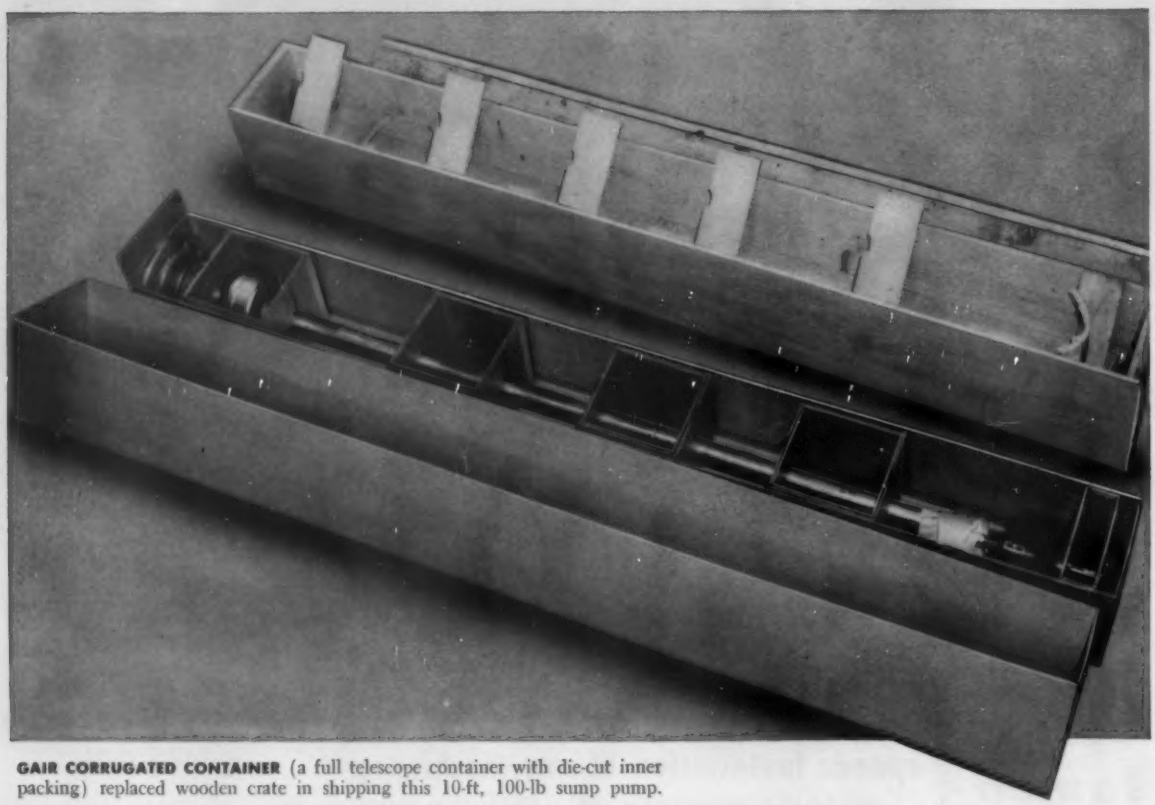
Van Norman
Van Norman Company
BOOTH #905

WIEDEMANN
Wiedemann Machine Co.
BOOTH #1420

For more facts circle 549 on Reply Card

Switching FROM WOOD TO CORRUGATED

SAVES PUMP FIRM $4.50 A SHIPPING CONTAINER



GAIR CORRUGATED CONTAINER (a full telescope container with die-cut inner packing) replaced wooden crate in shipping this 10-ft, 100-lb sump pump.

Production men at Detroit's Penberthy Injector Co. are wearing big smiles since they switched from wooden crates to Gair corrugated shipping containers.

Product involved was their ten-foot sump pump that tips the scales at more than 100 pounds. That's why Penberthy's shipping department wasn't sure at first that corrugated was strong enough for the job. Gair convinced them by a number of test shipments to various parts of the country — *no damage!*

Now one man packs thirteen complete containers an hour — it used to take two men that long to turn out nine to ten containers. This represents a savings in packing and materials of $4.50 per unit. Add the fact that the new container is 42 pounds lighter — three of them can be shipped for the price of two wooden crates — and you see why Penberthy has closed down its crating shop.

Interested in knowing what suggestions we might have for improving *your* packing and shipping program? Call your nearest Gair plant.

YOU'RE LIVING NEXT DOOR TO THE EXPERT

GAIR CONTAINER PLANTS: Atlanta, Ga. • Cambridge, Mass. • Cleveland, Ohio • Holyoke, Mass. • Jackson, Miss. • Los Angeles, Cal. • Martinsville, Va. • New Orleans, La. • No. Tonawanda, N. Y. • Philadelphia, Pa. • Plymouth, Mich. • Portland, Conn. • Richmond, Va. • Syracuse, N. Y. • Teterboro, N. J.

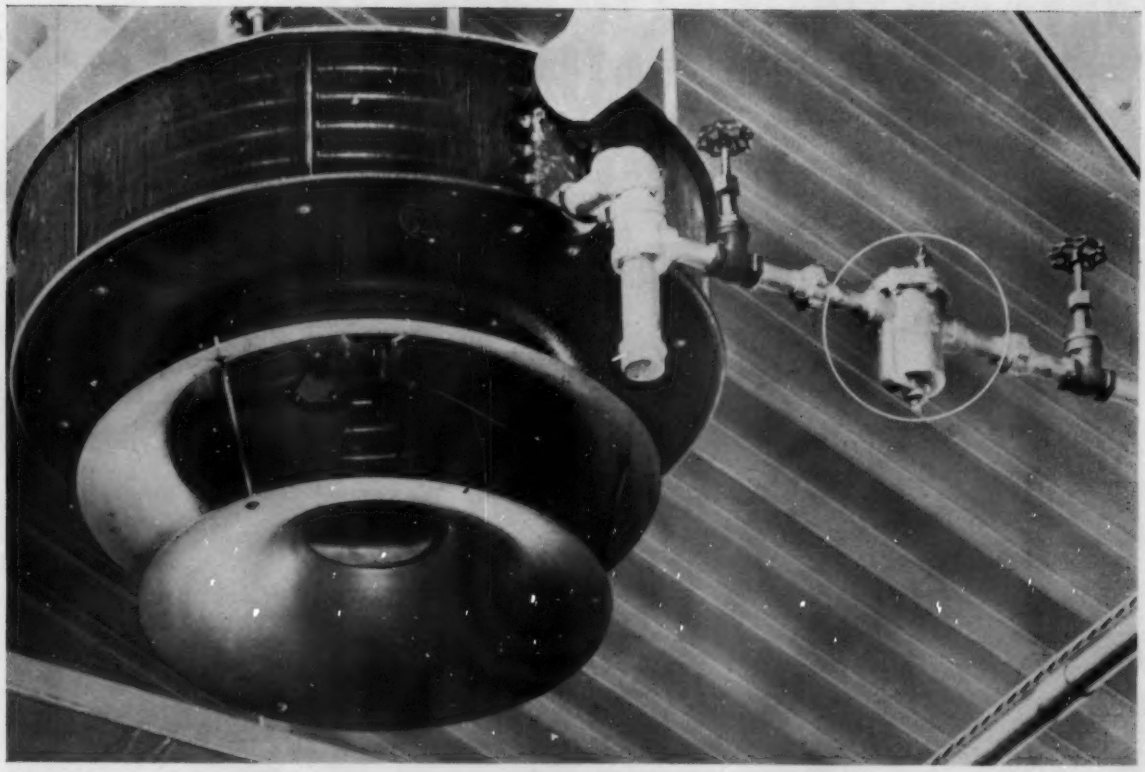
SINCE 1864 GAIR

GAIR SHIPPING CONTAINERS

FOLDING CARTONS • PAPERBOARD

ROBERT GAIR COMPANY, INC. • 155 EAST 44TH STREET • NEW YORK 17, N.Y. SC.5.7

For more facts circle 550 on Reply Card



Here's the Way to Trap a Unit Heater for Lots of Heat and Little Maintenance

The picture above is an outstanding guide to good unit heater trapping. This installation provides maximum heater efficiency and minimum maintenance time and cost.

1. Simplified piping. Horizontal in-line piping is made possible by the Armstrong side inlet—side outlet trap body. Note that the trap can be opened by removing the cap, without disturbing pipe connections.

2. Dirt pocket ahead of trap. The vertical pipe leg collects heavy dirt and scale. No strainer is needed because the self-scrubbing action of an Armstrong trap washes ordinary dirt right through it.

3. Test valve. The maintenance engineer can check this trap quickly and easily by opening the test cock shown installed in the trap cap.

4. Shut-off valves and unions. The trap can be repaired, or replaced with a spare trap, without shutting off any other units.

5. Generous sized trap. The Armstrong trap, selected from Table B-29 or C-29 in The Armstrong Steam Trap Book, provides a minimum safety factor of 3 to 1 for this job. Its big air handling capacity keeps the heater free of corrosion-producing air and CO_2, provides fast heat-up and full rated btu output. No lag—condensate is discharged at steam temperature.

6. A good steam trap. The Armstrong trap discharges condensate at steam temperature and it has large air venting capacity. The heater is always full of hot, dry steam.

The Armstrong trap mechanism cannot clog, bind, stick or collapse. Valve and seat are hardened chrome steel—all other working parts are stainless.

An Armstrong trap is rated conservatively on a basis of actual hot condensate capacity under job operating conditions. This is not true of all traps and is an important factor when comparing prices.

Armstrong traps are sold by factory-trained Representatives under an unconditional, money-back guarantee of satisfaction to the user.

For the best in unit heater trapping, call your local Armstrong Representative, or write:

ARMSTRONG MACHINE WORKS
912 Maple Street • Three Rivers, Michigan

FREE — "How to Trap Unit Heaters" is the title of pages 28 and 29 in The Armstrong Steam Trap Book. This 44-page catalog is a guide to good trapping practice. Send for your copy.

STEAM TRAPS FOR EVERY REQUIREMENT — APPLICATION ENGINEERED

ARMSTRONG STEAM TRAPS

For more facts circle 551 on Reply Card

NEAT WAY TO PLAY SAFE: JAL-TREAD FLOOR PLATE

Jal-Tread floor plate combines the strength and durability of high quality steel with a neat, distinctive checkerboard pattern scientifically designed for *safety*.

Whatever your application . . . in new construction . . . new equipment . . . or replacement jobs, Jal-Tread will assure you of these advantages:

Safe Footing—300 miniature squares per square foot—all of uniform height—provide maximum linear friction surface that protects you against lost-time accidents.

Easy Fabrication—The Jal-Tread straight line pattern simplifies welding, flanging, shearing, bending, punching, and drilling operations. Experience shows that Jal-Tread can be cold-formed on standard plate bending machines.

Easy Cleaning—The Jal-Tread straight line gutter pattern permits quick, thorough sweeping and draining in any direction.

For safe, long-lasting flooring always specify J&L Jal-Tread . . . *it's available at leading distributors everywhere.*

Jones & Laughlin STEEL CORPORATION — *Pittsburgh*

see our catalog in S ARCHITECTURAL FILE or write for copy

For more facts circle 552 on Reply Card

For more facts circle 553 on Reply Card →

A *Modern* AUTOTRANSFORMER STARTER

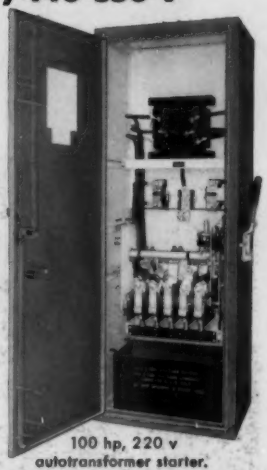
with Air Break Contacts up to 75 HP, 220 V; 150 HP, 440-550 V

Think of it! Air break, silver alloy contacts . . . no messy oil to bother with. The contacts stay in good condition without filing, cleaning, or dressing. This air break feature, alone, makes this Bulletin 646 starter the most up-to-date, manually operated, autotransformer starter on the market.

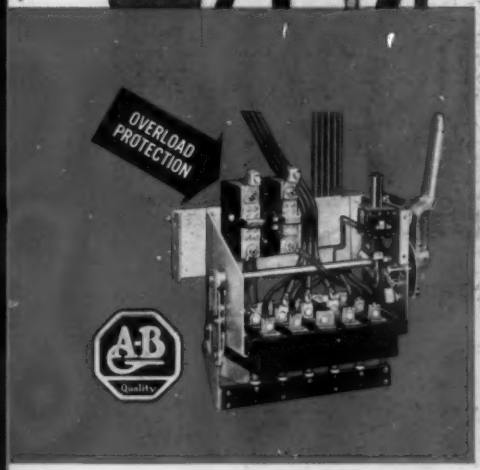
Air break contacts are standard for Sizes A, B, and C starters, but these starters can be furnished with oil-immersed contacts, where operating conditions require them. Only the Size D starter, rated up to 250 hp, uses oil immersed contacts. Write for Bulletin 646.

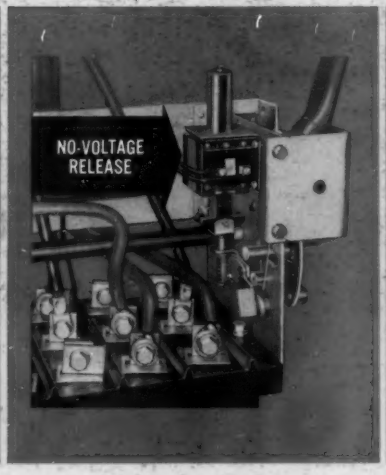
Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.

In Canada—
Allen-Bradley Canada Ltd., Galt, Ont.



100 hp, 220 v autotransformer starter.

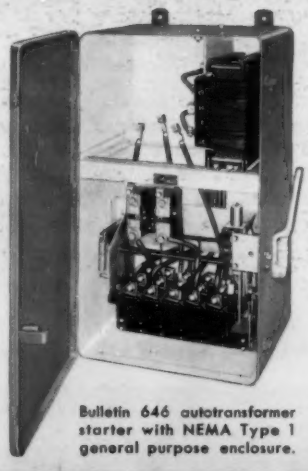




OVERLOAD PROTECTION—The Bulletin 646 autotransformer starter has two Bulletin 816 automatic reset thermal overload relays that assure dependable overload protection.

NO-VOLTAGE RELEASE—The starter contacts are held in the RUN position by a solenoid latch, which drops out if the line voltage fails and opens the starter contacts. The motor cannot restart, when line voltage is restored, unless the starter is operated through the starting cycle.

TIME DELAY DASH POT—The adjustable dash pot can be set for 0 to 15 seconds.



Bulletin 646 autotransformer starter with NEMA Type 1 general purpose enclosure.

SIGNAL BELL—A bell indicates when the starting lever is to be pushed into the RUN position. This feature removes the starting interval of the motor from the operator's judgment. Correct starting for existing line and motor conditions is the result.

AUTOTRANSFORMER—The open Delta-connected 3-phase autotransformer has 50%, 65%, and 80% reduced voltage taps. The starting voltage, therefore, can be easily adjusted to suit the load.

ALLEN-BRADLEY

BULLETIN 646 AUTOTRANSFORMER STARTER

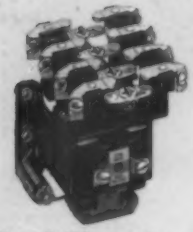
A-B Quality

7-55-M

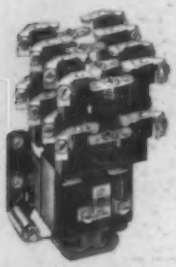
QUALITY RELAYS

for Long, Trouble Free Service in Critical Control Circuits

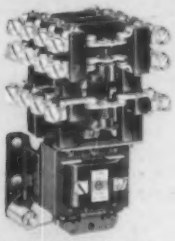
Type C-200 A-C 2-pole relay



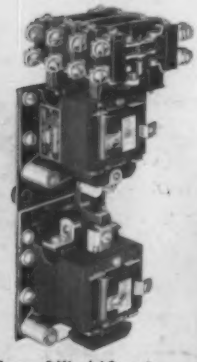
Type B-400 normally open 4-pole relay



Type B-800 normally open 8-pole relay



Type BX-840 universal 8-pole relay



Type BXL-440 universal relay with latch

Type BX-44 Universal 4-pole relay in NEMA Type 1 general purpose enclosure. To change from N.O. to N.C. contacts, or vice versa, just change terminal connections. Max rating—10 amperes.

Here is a line of small relays that is ruggedly built for tough industrial service. The simple solenoid design... with ONLY ONE MOVING PART... guarantees millions of failure free switching operations. The double break, silver alloy contacts need no cleaning, filing, or other maintenance. For complete Allen-Bradley relay data, please write for Bulletin 700.

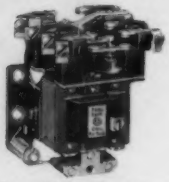
Allen-Bradley Co.
1316 S. Second St., Milwaukee 4, Wis.

In Canada—
Allen-Bradley Canada Ltd., Galt, Ont.

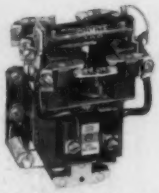
ALLEN-BRADLEY
BULLETIN 700 RELAYS
QUALITY

Type EX-440 D-C universal relay

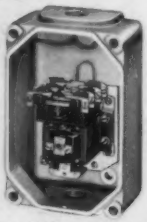
Type BX-220 universal 2-pole relay



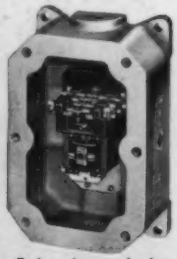
Type BM-200 mechanically held relay



Type BA-20 2-pole thermostat relay



Relay in watertight enclosure



Relay in explosion-proof enclosure

7-55-MR

Dimetcote is absolutely unique. It is not a paint, it contains no oils, resins or any other organic materials, yet it can be applied by spray or brush. When Dimetcote is applied to steel, a reaction takes place at the surface which produces chemical bonding as well as physical adhesion. It is almost impossible to find the interface between Dimetcote and the steel.

Dimetcote has many unusual characteristics. It shows no visible change after more than ten years exposure to the most severe weather conditions – sun, heat, fresh and salt water. It is insoluble in all solvents and petroleum products. It is highly abrasion resistant, but if abraded through to bare steel, the coating will cathodically inhibit corrosion.

Now tanks and structures can be given the same protection that galvanizing affords, *plus salt water resistance.* Existing structures need not be dismantled and new structures can be coated either before or after erection. *Only one coat* of Dimetcote over a sandblasted surface is required to protect such structures as:

Tank Exteriors • Cargo Tanks in Tankers • Dam Gates • Structural Steel • Christmas Trees • Buoys • Floating Roof Tanks • Offshore Rigs • Water Tanks • Barges • Ship Decks • Stacks

Write for the Dimetcote Technical Bulletin today.

Follow the line of MOST resistance:

Amercoat® CORPORATION
Dept. LI
4809 Firestone Blvd.,
South Gate, California

Evanston, Ill. • Kenilworth, N. J. • Jacksonville, Fla. • Houston, Tex.

For more facts circle 554 on Reply Card

WE SEPARATE

Oxide Particles

40

MILLIONTHS

OF AN INCH

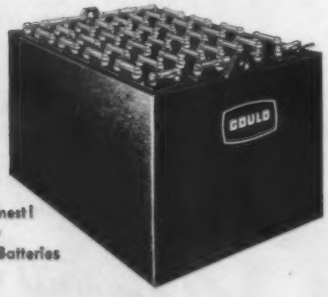
IN SIZE!

TO GIVE YOU GREATER BATTERY CAPACITY!

Illustrated above is a Thompson Classifier in the Gould Battery Research Laboratory at Depew, N. Y. It is used to separate, by flotation, particles of lead oxide so small that they'll pass through the finest sieve made.

Particle separation is important in achieving uniformity of oxide . . . and battery capacity and life are helped by having each type of oxide fall within a specific particle size range.

This method of particle separation quickly determines which oxides are best for various types of Gould Batteries. Another reason why you get better batteries from Gould through research.



America's Finest!
GOULD
Industrial Truck Batteries

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GOULD
Batteries

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TRENTON 7, N. J.

"BETTER BATTERIES THROUGH RESEARCH"

Always Use Gould-National Automobile and Truck Batteries

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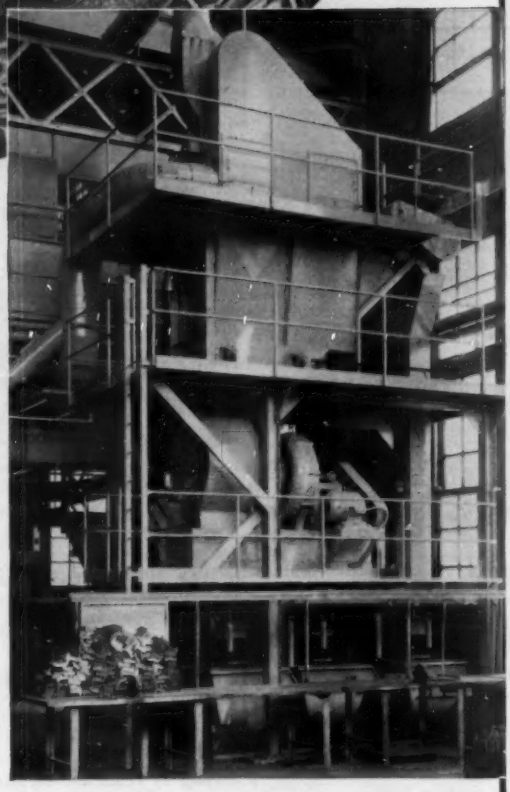
BETTER AIR IS OUR BUSINESS!

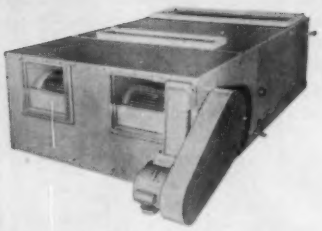


Two complete ROTO-CLONE systems occupy only 66 SQ. FT. of FLOOR SPACE

LACK of room is no alibi for not providing efficient dust control. Here's a dual ROTO-CLONE installation in a large foundry which occupies only 66 sq. ft. of floor space. A Type D of 4500 cfm capacity, located on lower platform, collects snag grinder dust. At top, a Type N of 6000 cfm capacity exhausts abrasive cleaning equipment. Dust and sludge from the two units are discharged through chutes into covered tote boxes at bottom for later disposal.

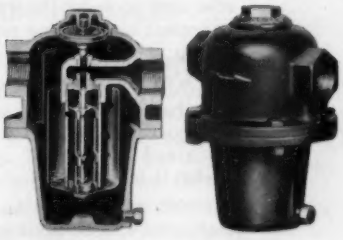
Every dust collector in AAF's complete line is a space saver. And with all this compactness, every unit is a high efficiency collector designed for constant exhaust volume and maintained performance over a wide range of operating conditions.

Remember—there is always room for modern dust control. The right equipment coupled with creative engineering thinking is certain to come up with a practical, economical solution. AAF has both. We'd like to prove it in your plant.



herman nelson Heating and Ventilating Units—designed for mixing, filtering and heating make-up air for exhausted areas. Available in capacities from 1200 to 26,000 cfm for steam or hot water heat.

AAF ROLL-O-MATIC—an automatic air filter featuring a renewable media filter curtain of bonded glass fibers in roll form. As clean media is introduced at top of filter, soiled material is re-rolled at bottom.



illinois Float and Thermostatic Traps—made in three sizes for operating ranges from 50 pounds pressure to 25 inches vacuum.

American Air Filter Company, Inc.
228 Central Avenue, Louisville 8, Ky.

I would appreciate receiving catalogs describing the following products—

- ☐ **ROTO-CLONE** Dust Control
- ☐ *Roll-o-matic* Air Filter
- ☐ **illinois** Traps
- ☐ *herman nelson* Heating and Ventilating Units

Name_____

Company_____

Street_____

City_____ State_____

American Air Filter
COMPANY, INC.
228 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

For more facts circle 556 on Reply Card

SPECIAL . . . for chlorine service

OIC 600-LB. FORGED STEEL, O. S. & Y. VALVES

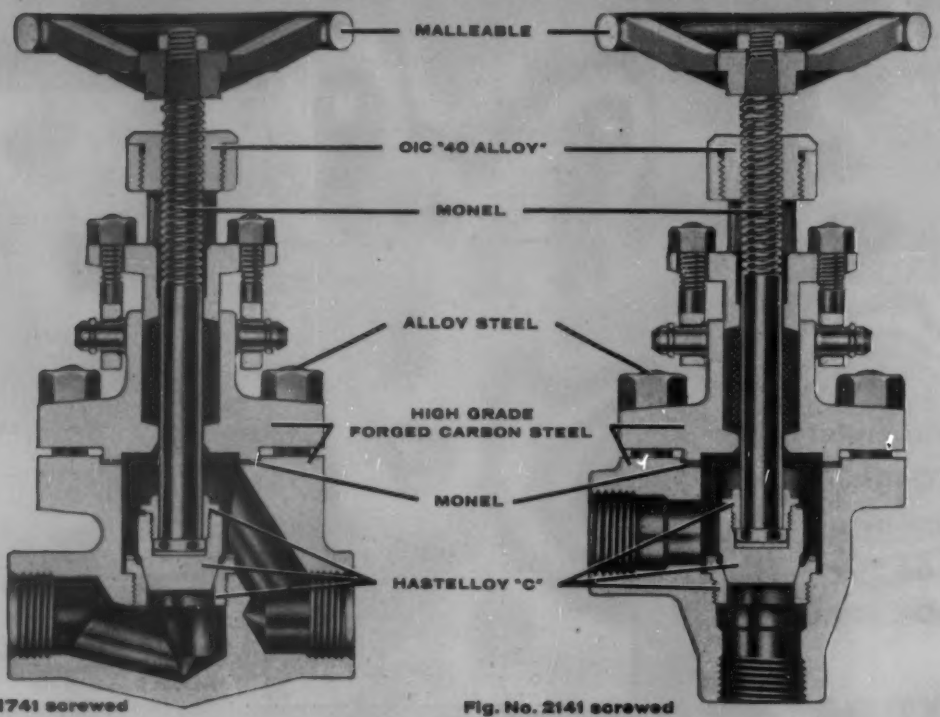


Fig. No. 1741 screwed
Fig. No. 1740 flanged

Fig. No. 2141 screwed
Fig. No. 2140 flanged

Proper design and the correct choice of metals combine in this OIC Forged Steel line to assure adequate strength, safety, and long trouble-free operation on chlorine service.

Hastelloy "C" swivel nut—disc—seat ring—Resist corrosive action of chlorine, increasing service life.

Monel stem—body-bonnet gasket—The monel stem resists corrosion. It is of generous size and accurately machined for ease of operation. The soft monel gasket is ideal for chlorine service.

OIC "40 Alloy" yoke bushing—"40 Alloy" is an aluminum-silicon-bronze which will not corrode, gall or seize. Its use adds to the ease of operation and increases the valve's service life.

High-Grade Forged Carbon Steel pressure parts—Amply proportioned wall thicknesses throughout provide strength and safety.

Alloy Steel Bolting 4 bonnet studs—Of proper size and quality to assure safety and ruggedness at the joint.

Malleable handwheel—Heavy and large, shaped for non-slip gripping.

Packing is resistant to the corrosive action of chlorine. A back seating arrangement permits repacking in a full open position.

A wide seating surface of 30° included angle permits close flow regulation. Each valve is carefully inspected at assembly, and tested at 300 psi air under water.

Write for Bulletin No. 1000, which describes these valves more fully. It also contains information on valves for black, green and white liquor services. Request also Bulletin No. 195, which describes the redesigned OIC line of Forged Steel Gate Valves.

Contact your nearby OIC Distributor for all your valve needs.

OIC FOUNDED 1893

THE OHIO INJECTOR COMPANY • WADSWORTH, OHIO

VALVES | FORGED & CAST STEEL, LUBRICATED PLUG, BRONZE & IRON

For more facts circle 557 on Reply Card

COURT DECISIONS — a summary of legal findings of interest to the plant engineer

Prepared by Albert Woodruff Gray

Planing Mill

IN CONDUCTING a wholesale and retail sash and door business at Inglewood, California, a planing mill was located in a zone that permitted the production of wood products wholly within the building when manufactured entirely from previously prepared material.

Residents nearby, but located in another residential zone, complained that the incinerator of the mill emitted volumes of heavy, black smoke, charred sawdust accompanied by noise and vibrations, plus soot and dirt which infiltrated into these dwellings.

The lumber used at the mill, except for sawing, had been prepared elsewhere and when received was run through a saw to acquire the necessary dimensions.

Suit was brought by these nearby residents asking for an injunction against the operation of the mill as a public and private nuisance detrimental to the public health and welfare.

The court held that no violation of this zoning ordinance had occurred and that the operations of the mill were conducted in a reasonable and necessary manner, usual and customary in the operation of such business and that the mill operators were not maintaining a public or private nuisance but operating a mill in a properly zoned area. Eckles v. E. D. Delaney, Inc., 279 Pac. 798, California, Feb. 11, 1955.

Borrowed Employee

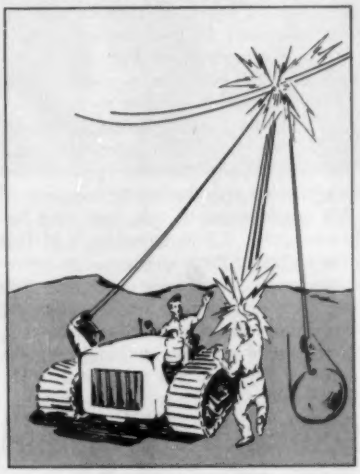
A CRANE was rented to a contractor for digging test holes for a Rhode Island oil company. The excavating was along a gasoline pipe line over which were strung three high tension wires, thirty-five to forty feet from the ground.

The crane was operated by an employee of the owner while the contractor who had rented the crane, directed the work. The contractor in indicating a test hole to be dug, cautioned the crane operator against a contact with the overhead power wires. The crane operator replied, "I've been driving a crane for twenty-seven years. I know what I've got to do."

The beam of the crane hit the wires. The contractor, his hand on the crane, fell unconscious with third degree burns. He later brought suit against the owner of the crane who contended in his defense that the operator of the crane, while on this job was an employee of the contractor.

The Supreme Court of Rhode Island in sustaining a judgment against the owner of the crane, said,

"Whether the loaned servant is to continue in the general employment of the lending master is ordinarily a question of fact. But in the absence of evidence to the contrary there is an



inference that such general employment continues so long as the service rendered by the servant is the business entrusted to him by his general employer.

"Here the business entrusted to the crane operator by its owner was the operation of its crane as directed by the injured man under the contract of hiring. This farming out of its servants and equipment does not necessarily imply that the crane owner's control over them ceased while they were operating the crane for the injured man." Agostini v. W. J. Halloran Co., 111 A. 2d 573, Connecticut, February 9, 1955.

Use of Competitor's Trade-Mark

A MANUFACTURER of toy automobiles appropriated a competitor's trademark, a horse's head on the front of toy automobiles with reins for a child to hold. The competitor sued and was granted an injunction in the lower court against the use of this emblem by the manufacturer.

On appeal however, the judgment was reversed by the Supreme Court of the state. "At first blush it seems shocking," said the court, "that any person can copy or imitate an article made, manufactured or sold by another. However, on analysis it is clear that copying the ideas and unpatented commercial articles of others has contributed tremendously to the progress and prosperity of the United States and it is in the best interest of the vast majority of the people, since it restricts monopoly and enables people to purchase useful or necessary articles at low competitive prices.

"Moreover, the manufacturer of an article of general use, or the inventor of a trade-mark, or a trade name, is not without protection. He can have his article, trade-mark or trade name patented or copyrighted in which event he will be protected against infringement. Furthermore, he can and will be protected if his article, trade-mark or trade name has acquired a so-called special or secondary meaning.

"Where the article of trade, or a trade-mark or trade name is not patented and has not acquired a so-called special or secondary meaning, it may be copied, manufactured and sold by any other person, provided it is not manufactured or sold as the inventor's product or under a name confusingly or deceptively similar to the inventor's." Jessar Manufacturing Corp. v. Berlin, 110 Atl. 2d 396, Pennsylvania, January 6, 1955.

Refusal To Bargain

NATIONAL LABOR Relations Board petitioned the Federal Court for the enforcement of its order for the reinstatement of employees of an Ohio clay products company, which the Board had held had refused to bargain in violation of the statute.

After eight meetings between the employees' bargaining agents and the company in fruitless negotiations for an employment contract, the bargaining had broken down on the insistence of the employees on a union shop.

The Federal Court in refusing to sustain the findings of the Board, said of situations of this character,

"When a genuine impasse is reached the employer, unless conditions change, usually may abstain from further negotiations. The Act does not attempt to settle industrial disputes. It leaves parties to the resultant of their best economic powers and while it does force them to trade with each other it may be assumed to contemplate only bona fide negotiations. Hence it is no doubt true that it does not require fur-

COURT DECISIONS

ther negotiations after it becomes apparent that an agreement is impossible.

"Assuming, as urged by the Board, that a closed shop demand is a proper subject for bargaining, we do not believe that this employer was required to continue the discussion indefinitely. Both sides had endeavored for many months to agree and they were unable to do so. Neither side was required to accept the proposal made by the other. The same thing may be said for other matters of dispute which had long been considered and discussed.

"We consider that in spite of the discharges of the employees above mentioned for their union activities the evidence does not sustain the Board's conclusion that there was a refusal on the part of the employer to bargain with the union in violation of the Act." N.L.R.B. v. Cambria Clay Products Co., 215 Fed. 2d 48, July 7, 1954.

Damaged Crane

IN ORDER TO unload a twenty-eight ton vulcanizer from a flat car for a rubber company at Naugatuck, Connecticut, a contractor rented a crane and two wire slings or chokers, to be operated by employees hired by the owner of the crane.

One of these slings, in unloading the vulcanizer from the truck transporting it from the railroad freight yard, had been looped over the hook of the crane and the other sling over another crane also employed on this job. In lowering the vulcanizer one of the slings broke and the end of the vulcanizer in dropping to the ground, damaged the crane.

The Connecticut court in sustaining the defense of the contractor to the action brought by the owner of the crane for this damage, that the sling had been defective, said,

"It is true that when a lessee returns the leased property to the owner in a damaged condition there arises a presumption that the damage was the result of the lessee's negligence. This presumption prevails unless and until the lessee proves the actual circumstances involved in the damaging of the property. If those circumstances are proved then the burden is upon the owner to satisfy the court that the lessee's conduct in the matter constituted negligence.

"As applied to the present case this rule means that to escape the presumption of negligence the lessee had to prove the circumstances of the fall of the vulcanizer. If the wire sling which gave way, which was the property of the owner, was defective, then this contractor satisfied the requirement that he prove the circumstances attending the fall of the vulcanizer." Leake and Nelson Co. v. W. J. Megin, Inc., 111 Atl. 2d 559, Connecticut, January 25, 1955.

Severance Pay

DISCHARGED EMPLOYEES of a printing plant in New Jersey sued for severance pay under the provision of a collective bargaining agreement that, "When an employee is discharged for any reason other than gross misconduct he shall be paid, in addition to any sum otherwise due him, one week's pay for each six months of continuous service or major fraction thereof."

The court granted the employees the severance pay. "It's purpose," said the court, "is to carry an employee for an interim period after termination of his employment to tide him over between jobs. I will therefore hold that the rights of these employees to severance pay, commencing with the date of their employment and terminating with the expiration of the last contract, was earned and accrued, and only the time of payment was postponed to the time when they were discharged." Owens v. Press Publishing Co., 111 Atl. 2d 796, New Jersey, Feb. 17, 1955.

Injury From Beryllium Dust

TO DISCARD worn out flourescent light tubes, an employe had to break them up in a barrel as waste. For five years he continued in this work of

breaking the tubes. For the next three years, however, the tubes were put into barrels without breaking. Two years after he had discontinued performing this work he reported to a doctor symptoms of a disease that, after three years, was diagnosed as berylliosis.

The employee then sued the manufacturer of these tubes in the Federal District Court in Connecticut for negligence. The manufacturer asked the court to dismiss the suit as under the law of that state an action for personal injuries from negligence must be brought within one year and for other injuries within three years from the date of the injury.

In its dismissal of this action the court said, "The general rule seems to be that where an injury was inflicted, here the exposure to beryllium dust, the period of limitation for actions of this kind commences from the date of the wrongful act or omission although its results may not then have been developed." Zimmerer v. General Electric Co., 126 F. S. 690, Connecticut, December 8, 1954.

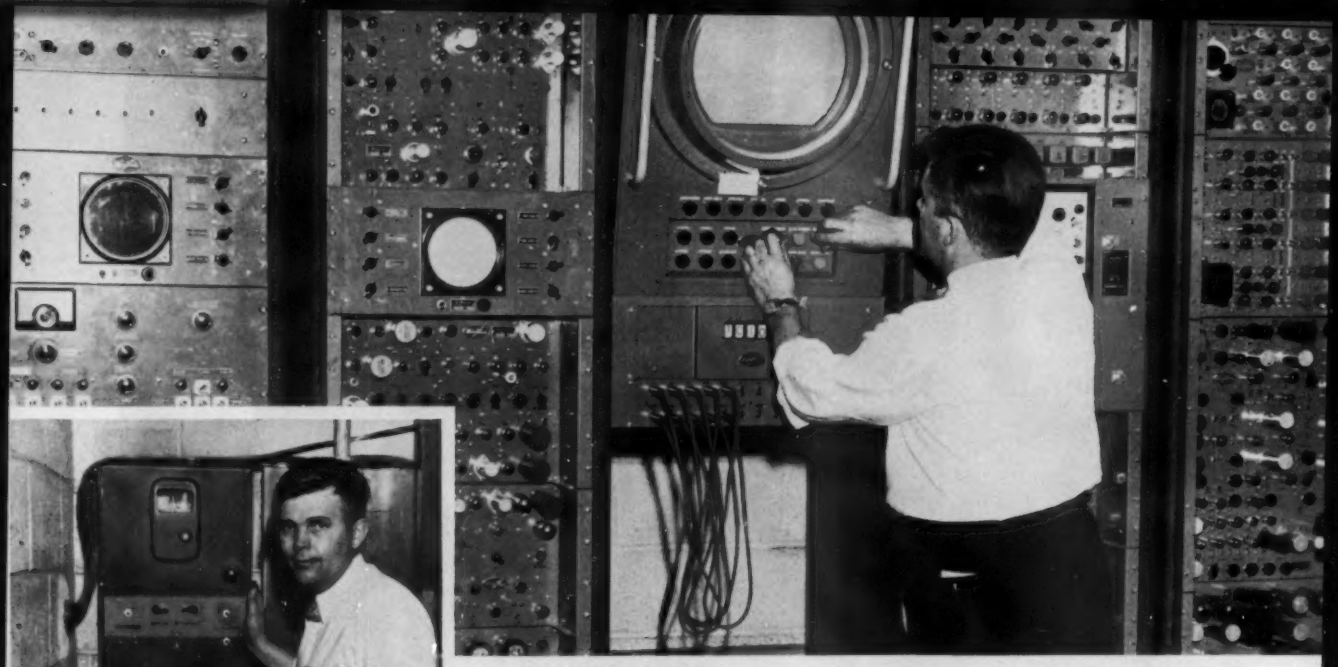
Discharge of Communist

AN ELECTRICAL manufacturer made a collective bargaining agreement with the United Electrical Radio and Machine Workers of America.

Four months later, while the agreement was still in effect, the company issued the statement that it would immediately discharge any admitted communists and saboteurs with the provision that an employee who invoked the Fifth Amendment of the United States Constitution in refusing to testify concerning communist affiliations, espionage and sabotage before a Congressional Committee, would be suspended without loss of pay for ninety days but would be reinstated at the end of that period if he appeared before such a committee, fully answered the questions asked, did not admit of communist affiliations and had a certificate from an accredited agency that no evidence had been found indicating he was a communist. Failing to do so he would be discharged.

An employee of the company appeared before a subcommittee of the Senate Judiciary Committee under subpoena, invoked this constitutional privilege of the Fifth Amendment, was suspended from employment and discharged at the end of ninety days. The union sued for an injunction and damages on the ground that such action by the employer was a violation of the collective bargaining agreement.

The Federal Court in its decision in favor of the employer said, "An employer's right to employ and discharge whom he pleases, in the absence of statutory or contractual provisions, is unquestioned." United Electrical Radio & Machine Workers of America v. General Electric Co., 127 F. S. 934, December 30, 1954.

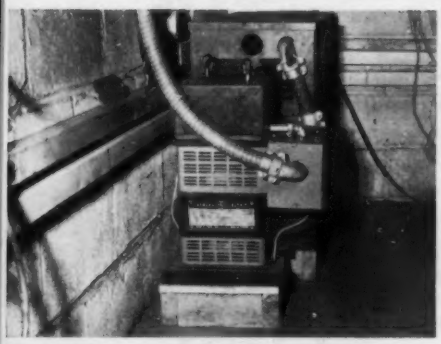


"We set it at 117 volts and forgot it . . . we just flick the switch and the Inductrol goes to work."

POOR VOLTAGE was the culprit that caused excessive tube burnouts and difficulty in testing color TV monitors at the Wickes Engineering and Construction Co. of Camden, New Jersey.

According to T. W. (Bill) Olsen, Engineer in charge of the Testing Lab, the voltage to the test panels at the rear of the lab really varied . . . sometimes even down to 105 volts when their big air compressor kicked over. Mr. Olsen found the answer to his problem in a General Electric Inductrol (a dry-type induction voltage regulator).

"We had a voltage problem on our main test panel, but now OUR G-E INDUCTROL GIVES US CONSTANT VOLTAGE"



"It's so small, we were able to install the Inductrol in this unused corner," said Bill Olsen, Engineer in Charge of Wickes' Testing Laboratory.

"It's surprising how this small piece of equipment has ended our voltage troubles," said Bill Olsen. It was set for 117 volts and corrects most voltage deviations in about one second.

THE EFFECTS OF VOLTAGE on electronic tubes (110% voltage causes 70% life reduction, 90% voltage—only 60 to 90% output) is typical of how fluctuating voltage affects all electrical equipment. Whenever the voltage varies on the terminals of a utilization device, something is sacrificed either in the life or the performance of that equipment.

Where poor voltage causes excessive burnouts or equipment malfunctioning, use Inductrols. These voltage regulators eliminate production bottlenecks . . . save you many dollars by extending equipment life, reducing manufacturing rejections and downtime.

A complete line of Inductrols is available for circuits up to 600 volts, 240 kva, single-phase; 720 kva three-phase. For more information, contact your nearest G-E Apparatus Sales Office or Agent, or write for Bulletins GEC-795 and GEA-5824 to Section 423-206, G.E. Co., Schenectady 5, N.Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

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"As good as new" reports Steers Sand and Gravel Corp. on the Ni-Rod weld that has kept this 20-foot lathe in operation since a 1946 breakdown. Three passes and three pounds of 5/32" Ni-Rod joined the cast iron hub to steel face plate after 300°F. preheat. Hub and weld support 250 lbs. in the face plate and chuck alone. The lathe is used every day for maintenance work at Steers' Northport, L. I. sand pit.

Ni-Rod gave this lathe a new lease on life

See the weld in this picture? It joins a steel plate to a cast iron hub. It has been keeping this 20-foot lathe in operation ever since replacement parts were no longer available.

The weld was made in 1946 with Ni-Rod®. It has proved 100% satisfactory.

Success stories like this show how Ni-Rod fills the need for a general purpose electrode for welding cast iron. Even welders of limited experience get sound, machinable welds with Ni-Rod.

Today, most welders prefer Ni-Rod's new companion electrode, Ni-Rod "55"® for welding cast iron to steel.

They find that Ni-Rod "55" gives even greater strength in these specialized jobs: welding heavy sections, high phosphorous irons, Ductile Iron, Ni-Resist®, high-strength cast irons, and joining cast iron to other metals.

If you work with cast iron, Ni-Rod and Ni-Rod "55" are a "welding team" that can help you as they have thousands of others. Help you simplify cast iron assemblies. Help you save worn or damaged parts that otherwise you'd scrap.

Ni-Rod and Ni-Rod "55" are easy electrodes to handle. Usually they require no preheat or postheat. And you can always expect sound, machinable welds.

Write today and ask for our FREE FOLDER, "Repair Cast Iron Parts Quickly and Easily."

The INTERNATIONAL NICKEL COMPANY, Inc.
67 Wall Street New York 5, N. Y.

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WELDING PRODUCTS
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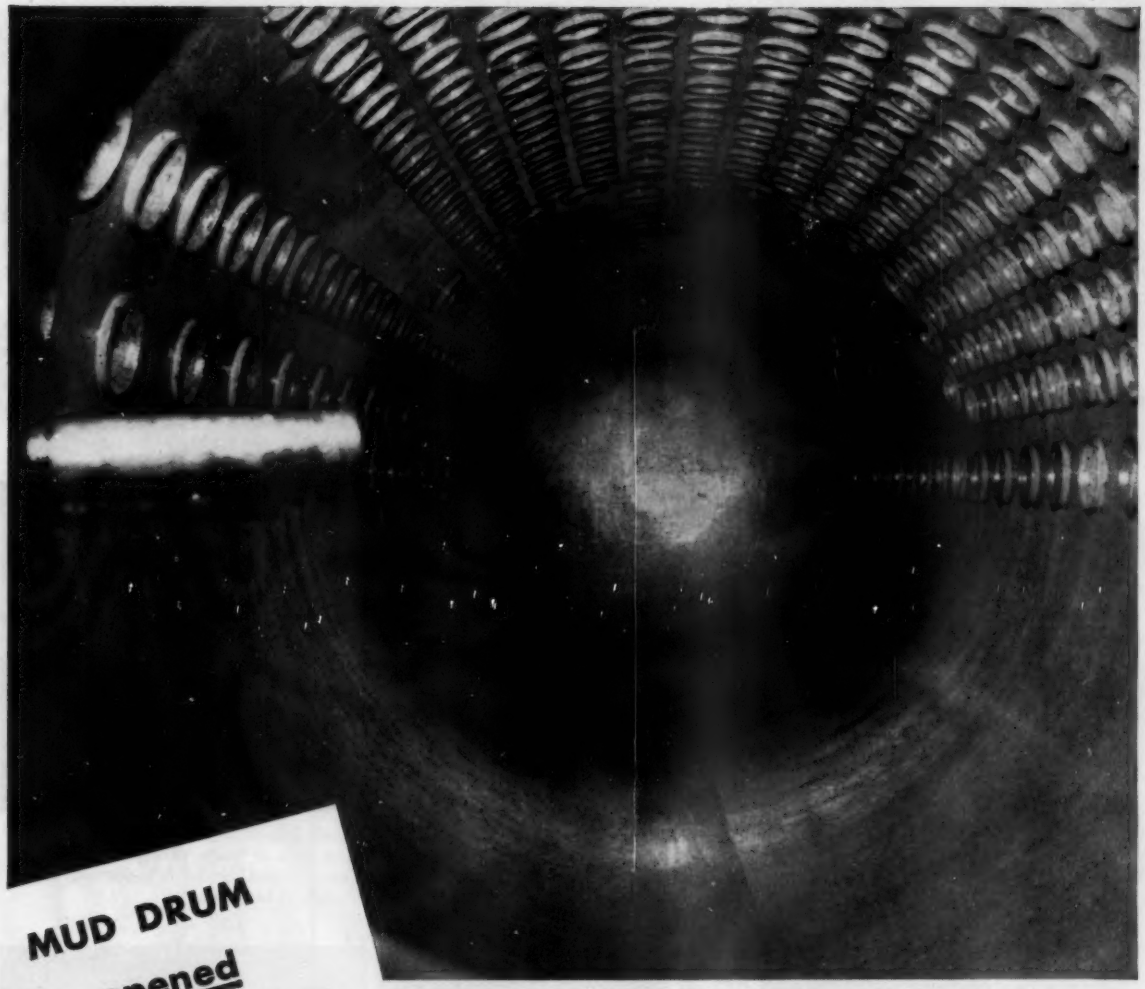

MUD DRUM
as opened
after one year
on line
with
THE *Nalco* SYSTEM

Unretouched photo of Nalco treated boiler at Georgia Institute of Technology, Atlanta, Georgia

● Calling this a mud drum serves only to identify its location . . . it is perfectly clean after a full year on line. The unretouched photo was taken immediately after the drum was opened. No wash-out was necessary. Not only is the drum free of scale and corrosion . . . Nalco sludge conditioning operated so effectively that even under the static, off-line draining condition, no sludge deposited in tubes or drums.

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For complete information on these construction cost cutters, contact your local Alcoa sales office. Or write: ALUMINUM COMPANY OF AMERICA, 861-J Alcoa Building, Mellon Square, Pittsburgh 19, Pennsylvania.

Alcoa Aluminum Perforated Corrugated Sheet—a highly effective acoustical paneling which may also be used as the inside sheet on insulated sandwich walls.

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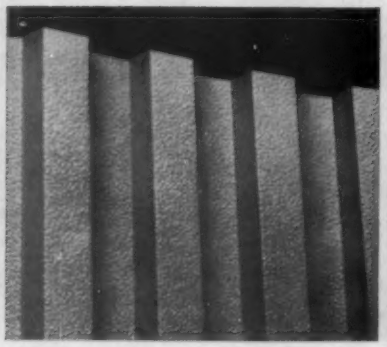

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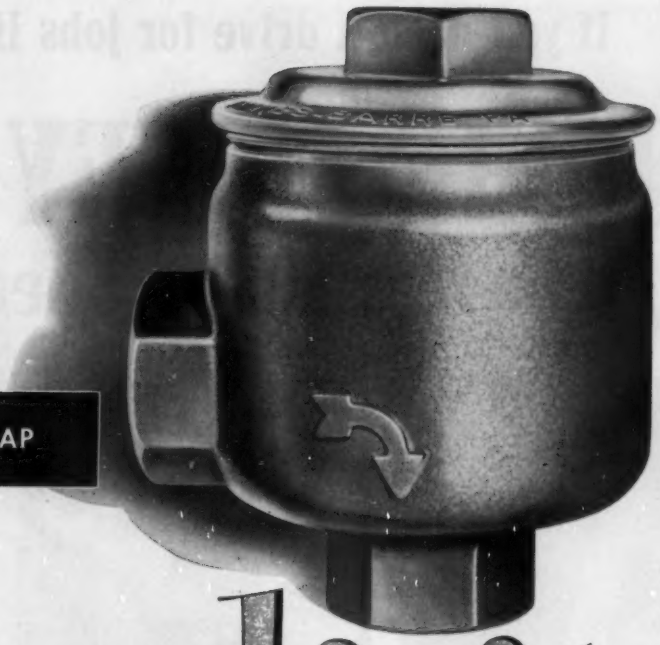
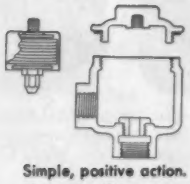


STEAM TRAP

Simplicity



Simple, positive action. Has only three parts —thermostatic bellows, body, cap. Won't leak!

Nicholson simplicity. Pays off big in any plant—in peak performance, easy maintenance. Simple in design, simple in operation, Nicholson Industrial Traps prove the most effective method for discharging condensate and air from steam lines.

- **Fast, intermittent valve action.**
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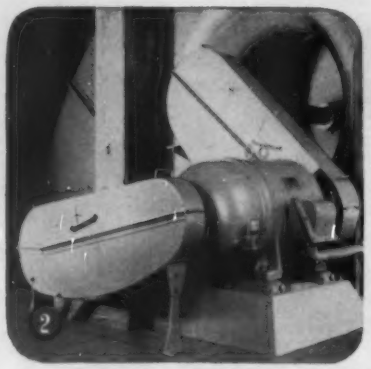
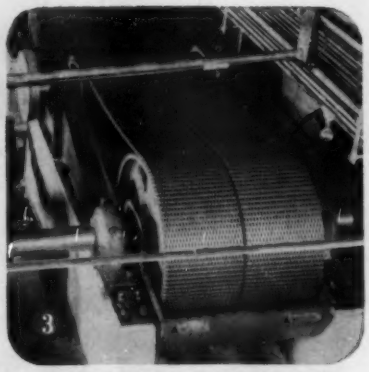
If you need a drive for jobs like these--

YOU'RE MONEY AHEAD
with LINK-BELT Silent Chain

1 ADVERSE OPERATING CONDITIONS. Humidity, heat, cold do not lower Link-Belt Silent Chain's better-than-98% efficiency.



2 UNFAILING SAFETY. Dependability assures continued production. On above tunnel ventilators, Link-Belt drives protect human life.



3 LARGE OR SMALL HP. A versatile line, Link-Belt Silent Chain drives are available from fractional to thousands of horsepower.

4 LARGE RATIOS. Link-Belt Silent Chain operates efficiently on extremely short centers at ratios as high as 10-to-1.

5 LIMITED SPACE. Easy to assemble in close quarters, Link-Belt Silent Chain permits built-in drives, compact housings.

6 HIGH SPEED. After 13 years on this newspaper press at speeds up to 4700 fpm, Silent Chain is still efficient.

Here's why Link-Belt Silent Chain Drives offer you more per dollar spent:

- Lower cost—often lower in first cost, always lower in ultimate cost.
- Longer life—trouble-free performance for 25 or 30 years is common.
- No dismantling machine or removing sheaves for repairs.
- Better than 98% efficiency.
- Maintained ratio assures full productive capacity.
- Slipless action assures a better product.
- Easy to install.
- Safe to employees—operates in oil-retaining casing.

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13.440

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LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

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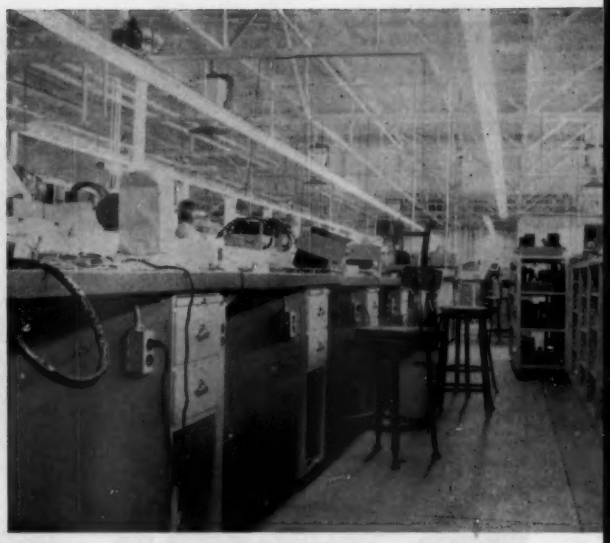
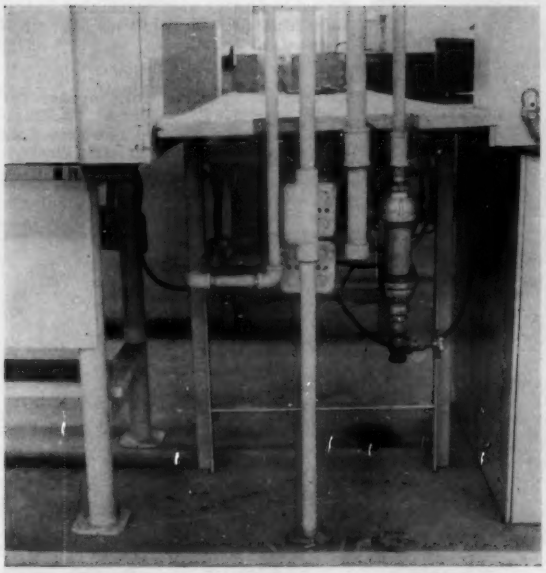


Note 5 ft by 5 ft module in practice. All benches run parallel with utilities; also, benches plug into each other



Major utilities drop to rack which is piped and conduited on its underside. Move the rack, disconnect hooked-in runs of benches and this part of your move is nearly done

Beckman Instruments Adopts Module Concept

Plant Designed Around "Work Unit"

If you know you're going to move soon, why set your equipment and your plans in concrete? . . . Here, everything from interior walls and fencing to drill presses and work benches can lead the gypsy life without extra cost

RESHUFFLING a production unit—its machinery, workbenches and supporting fixtures—is a complex project. Floors must be torn up; walls removed; utilities relocated. Not so, however, at Beckman Instruments, Inc.'s new, $2,500,000 Fullerton, Calif. plant.

Why? Because the Beckman facility was laid out with frequent moves in mind—moves predicated upon the company's short-run production of some 50 electronic instruments and their more than 200 accessories.

Says Plant Engineer John Roome, "We've only been in this plant a year. Already some departments have been rearranged two, even three times. Movements are continuous, week to week. Yet for us, even a major departmental relocation involves only a few hours—little more than uncoupling utilities and relocating our standardized workbenches."

Behind this apparent solution to one of plant engineering's more tedious chores is the "module" concept, a theory put to practice at Beckman.

Module Concept

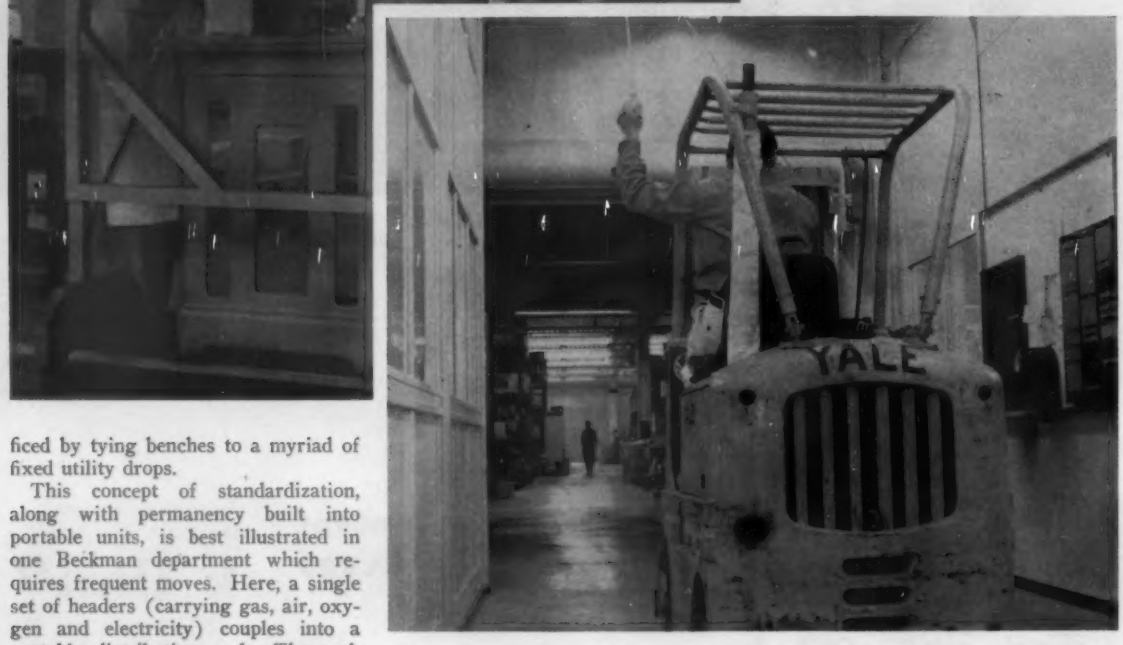
The module concept in brief: total standardization of work areas. More specifically—establishment of a fixed, minimum working area, required for every employee and his machine, expressed in square feet.

"It's like laying out a floor using say, 3- by 3-in. tiles," says Roome. "You start with one tile, keep building from there. You can slip one tile out of the layout, substitute another, without much trouble. That's the 'module' idea. It means a lot less work for plant engineering."

At Beckman, the standard "work module," established through time-motion studies, is 25 sq ft. Thus, each worker needs a 5- by 5-ft area for himself and his workbench. Carried still further, each work module is itself standardized—its benches and work tables identical. Example: every one of Beckman's 600 benches and counters are 5 by 2½ ft. This leaves a similar area for the worker and his chair or stool. More important, standardized workbenches, each piped and conduited, plug into one another. Slip a sink-installed counter out of its module and, with minimum effort and a bit of recoupling, you can slip in another.

Permanency is thus built into benches, which are portable. Since benches plug into adjacent benches, often a single utility drop serves a dozen of them. Mobility isn't sacri-

Portable screens keep machining operations isolated; also help keep area clean



Lift truck operator pulls opener for door separating Beckman buildings. Once in corridor electric eyes keep door open until lift truck completely clears it

ficed by tying benches to a myriad of fixed utility drops.

This concept of standardization, along with permanency built into portable units, is best illustrated in one Beckman department which requires frequent moves. Here, a single set of headers (carrying gas, air, oxygen and electricity) couples into a portable distribution rack. The rack is nothing more than a 3-ft wide bench, running laterally through the department. Rows of workbenches couple to it at right angles. Thus, the rack, which carries a heavy load of utility runs on its underside (and thus out-of-sight), acts as a kind of temporary distribution center. A few headers dropped from overhead serve the entire department.

Suppose a move is contemplated. Plant engineering merely uncouples a few headers, installs a new drop at the future department site. The portable distribution rack is uncoupled from its benches and is fork lifted to the new location. Each workbench and counter is unplugged from the next, and moved. Couplings are tightened, a few valves opened and the new department is in production. The cost: negligible.

Behind it all, of course, is the module concept of standardization. Without it, moves would not be nearly so simple.

Some other examples of Beckman's standardized layout:

(1) Interior walls—most of them are movable. Thus, walls which box-in various engineering stations consist of standardized, 5-ft long, 5-ft high cabinets. They serve as both walls and storage space. Because walls are only 5 ft tall, engineers can look over them, quickly locate a fellow at a nearby desk or drawing board. Should the engineering department be reshuffled, it'll be merely a matter of moving a given number of standardized cabinets, forming new walls and aisles.

(2) Similar standardization applies to lab counters, which are more complex in their piping. Again, utilities are permanently installed in each portable lab counter. If a counter needs to be moved, all that's involved are a few couplings. Another counter can be moved in, recoupled—and the lab's back in business.

(3) Fencing, in various warehouse sections is unitized. Each panel is 5 ft high, 5 ft wide. Suppose plant engineering is asked to convert a fenced area into a fork-lift wide doorway. Two fence sections are unbolted, a doorway section installed.

(4) Same applies to long lines of drill presses. As many as two dozen are mounted on a single table. One utility drop powers them all. One uncoupling does the trick. The load of conduiting is built into the table.

(5) What of the many sinks required at Beckman? Well, that too has been provided for. Underfloor runs a closely-spaced waste grid.

Along this grid are spaced future drain locations. These "future" manholes are so located that regardless of a sink's location, it'll be within 20 ft of a sewer outlet. Orange County codes allow semi-permanent sewage piping to run 20 ft between drain and sink. Thus, a counter sink may be installed with gravity piping, emptying into a floor sink positioned over a manhole. To move a counter: uncouple the piping, remove the floor sink to a new manhole, replace the unneeded drain cover, recouple piping in new location.

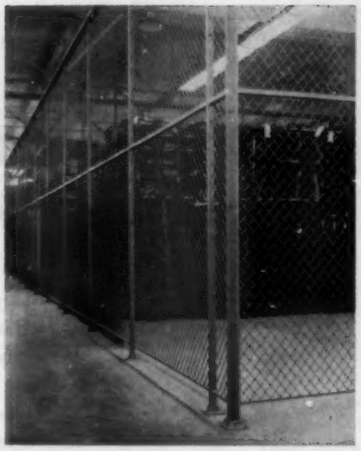
Utilities are Above

(6) The plant's assembly-manufacturing is contained in two buildings, both 160 ft wide, placed at right angles to one another, forming an L. The assembly building is essentially one large, unobstructed slab, with columns running only down its center. Along this column line (columns on 20-ft centers), runs a single, 10-ft wide fork lift aisle. Trusses carry the utilities: gas and cold water from an outside source; hot water from a circulating system; oxygen from a main bank; air from central compressor system; pure water from a demineralizer and storage tank; temperature, humidity control and air conditioning (circulating chilled water and hot water lines). From these main lines small feeders run laterally to stations needing service. But header drops are kept to minimum, thanks to standardization.

Says industrial engineering supervisor Robert R. Twombly, who had most to do with layout, "The module system works for us—works to advantage especially for industries not primarily engaged in mass production. It's a different story when an industry can set up a permanent production unit for long-run production. With us, moves are everyday affairs. The module concept reduces the cost of moving, speeds production."

Although engineering, assembly and some light manufacturing are contiguous—with no real walls between—noise level is low. Partly this is due to the light nature of the manufacturing. Partly, noise is absorbed by a relatively high roof (14 ft from floor to trusses, about 10 ft from truss to underroof).

Engineering is another good illustration of a single drop serving an entire section. There, as we've said, walls are actually 5-ft long, 5-ft high



Unitized warehouse fencing: take out a 5 ft by 5 ft section and insert a door

cabinets. Installed along cabinet tops are 110-volt plug strips. A single drop serves an entire section.

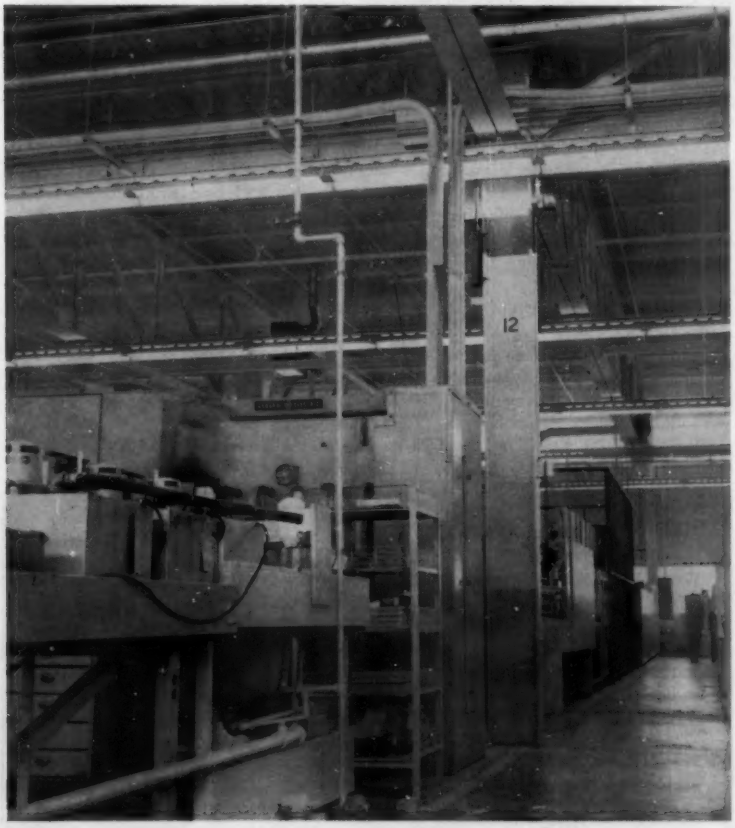
One department uses a high temperature furnace. Physically the furnace is small—about the size of a single bench. But its heat is great—upwards of 2200 C. Also objectionable was a high-decibel whistling from 100 psi oxygen used to generate this high temperature. Plant Engineer Roome wanted to minimize the noise, yet allow the heat to escape. His solution: he walled-in this objectionable production unit, fabricating vertical louvers from acoustical board. Air circulates readily. Sound is absorbed by the louvers.

Standardization is carried even farther. How many times has a maintenance man from your department been called to "replace a burnt out fluorescent tube?" And how many times has he arrived—with the wrong-size tube in hand?

At Beckman, all fluorescents are standardized to two sizes: 4-ft, 40-watt lamps (in the administrative section); 5-ft, 90-watt lamps in the plant. When a call comes, maintainers don't have to guess about lamp size.

Further, Roome was able to cut maintenance and installation cost by specifying standardized overhead lighting. Specifically: use of two five-foot fixtures, each carrying two 90-watt lamps, all four lamps operating from a single lamp ballast. The higher wattage lamps allow fewer runs of fluorescent fixtures, yet assure the desired 50 foot candles or above at desk level. Ballast costs are reduced. There's less copper, less installation, less original fixture cost. Again, the wide-spacing of fluorescent runs was possible only because production units are open and unobstructed by walls or partitions.

Aisle midcenter of building also carries utilities above. Seen here is power center



MAINTENANCE COSTS—
Do You Know When They're Excessive?

1 **If you have historical records of your equipment perhaps you can use this quickly-applied system to determine economical replacement ages for all equipment, including floors, walls, and roofs**

2 **This system should give you better utilization of capital investment; control data for running an efficient replacement program; and priority for preventive maintenance work**

3 **System is based on: Value of units to be maintained; operating conditions under which they work; and on your maintenance budget.**

4 **The "limit" in maintenance costs is easily determined when 1. You know the value of the piece of equipment. 2. Know its operating conditions. 3. And can assume the cost of maintenance at end of useful life.**

By B. A. MARGO, Consulting Management Engineer, Quebec, Canada

IN YOUR WORK AS plant engineer you are frequently faced with the problem: Is it worthwhile to continually repair these machines, these floors, these pipe lines or should we install new ones. Sometimes the answer is obvious. However, in the majority of cases you may have a hard time reaching a decision due to the complexity of the situation. Because of these difficulties you may find helpful the system described here. It makes answering one of your questions—is this or that maintenance cost excessive?—a simple routine. The answer, furthermore, may be arrived at without increasing the overhead of your department, providing you already have historical records of your buildings and equipment.

Advantages you may derive from the system are, in addition to reduced maintenance costs: a better utilization of the capital invested in property (since it may deter you from premature replacements); control data for running an efficient replacement program; a split-up of responsibilities which should make your life much easier; elimination of heated arguments caused by vague opinions.

Installation of the system is a once-occurring effort, a fascinating task. The calculations required are comparatively simple. To maintain it does not require a great deal of extra work, attention or ability. However, the system cannot be used to establish a maintenance budget or to form an opinion as to whether such a budget is too high or too low. You may use it though, to set up budgets for groups of machines, etc., in the frame work of the general maintenance budget.

Further, you may use it for setting up priorities for preventive maintenance work.

Presented in the first section of this article will be all the information you need for understanding the system without going into details.

The system is based on the following factors: 1—Value of the units to be maintained. 2—Operating conditions under which they work. 3—Maintenance budget.

The reasons for taking these three factors are: If you have one $25,000 machine and one $500 machine, you are prepared to allow higher maintenance costs for the more expensive one. Further, if you have a pump for cold, clear water and another one for hot acid, you have to allow higher maintenance costs for the latter. In other words, the system takes into consideration actual practices which every plant engineer follows instinctively.

Your budget has to be considered

Definition of Terms Used

Wear Point is a number used for measuring the effect of a certain degree of a specific operating condition upon the wear of a unit.

Wear Factor is a number characterizing the combined effect of operating conditions as measured by Wear Points upon the wear of a unit.

Average Wear Factor is the arithmetic average of all Wear Factors.

Wear Ratio is the quotient of the individual Wear Factor of a unit divided by the average Wear Factor.

Table I. This shows how the budget ties in with, and is affected by, the different phases through which the machine passes

Age	new	up to average	average	over average	end of useful life	should have been replaced
Maint. Costs	small	up to average	average	over average	LIMIT	excessive
	BUDGET					

too, since it tells us how much money is at our disposal for maintenance of all units. To simplify matters, we will brashly assume that actual expenditures equal the budget. The simple tabulation in Table I shows how the budget ties in with the different phases through which each unit passes during its stay in your plant.

The upper line shows these phases, the lower one the corresponding maintenance costs. "Limit" is reached at the "end of useful life" (useful from the viewpoint of maintenance costs). That is the time when maintenance costs become "excessive" (excessive according to concepts of this system).

We can set a "limit" for every unit if we know: 1—Its value; 2—Its operating conditions and; 3—If we make an assumption regarding maintenance costs at the end of useful life.

To define the various operating conditions we can use a Table of Wear Points, Table II. The total of Wear Points per unit is called Wear Factor. If we total all Wear Factors and divide them by the number of Wear Factors, we obtain an average Wear Factor for the whole plant. If we compare the individual Wear Factor to this average Wear Factor, we obtain Wear Ratios per unit which are a measure of the operating conditions pertaining to it, relative to average conditions.

Possibly you have an equipment register with purchase prices. If you bought a unit during the past few years, it is all right to use this purchase price figure. However, if you bought it some years ago, you would be well advised to adjust the original price according to the change of purchasing power of the dollar. Otherwise your basic data would not be consistent.

If you want to use the Consumer's Price Index as published by the Bureau of Labor Statistics as a measure for the purchasing power of the dollar, you may take the conversion factors as listed in Table III.

You may wonder why you should not take the book values. First, book values are not available for floors, roofs, etc. Second, book values are calculated solely to suit the regulations of tax authorities.

Table IV is a specimen table which shows Wear Points for various degrees of operating conditions. You would have to enlarge or condense it to suit operating conditions in your plant or, you may wish to make a distinction between corrosion, contamination etc., or perhaps you have equipment exposed to the open air (more complex than plain corrosion), and other units exposed to various degrees of heat.

You may establish such Wear Points using data from text books; the judgment of good maintenance men; laboratory tests; reliable maintenance records or a combination of these means. In any case, you should be able to

Table II. Table of Wear Points show how varying degrees of corrosion, usage, load, vibration and other factors are calculated for each piece of equipment

Capacity, Head or Pressure	1,000 gpm		5,000 gpm		10,000 gpm	
	R	small	R	medium	R	high
(Prefix "H")	H1	1.2	H2	1.4	H3	1.6

Usage	2,000 hr/year		4,000 hr/year		6,000 hr/year	
	R	1 shift	R	2 shifts	R	3 shifts
(Prefix "U")	U1	1.2	U2	2.6	U3	4.0

Load	Constant		Slight Fluctuation		Continuous Fluctuation		Repeated Shocks	
	R		R		R		R	
(Prefix "L")	L1	1.2	L2	1.7	L3	2.4	L4	3.6

Operating Condition	Degree					
Corrosion, Abrasive Content or Contamination	None		Low		High	
	R		R		R	
(Prefix "C")	C1	1	C2	1.1	C3	1.5

Vibration or Impact	None		Slight		Medium		Severe	
	R		R		R		R	
(Prefix "V")	V1	1	V2	2	V3	3	V4	4

Unsuitable Mat. used in construction of unit	R	
(Prefix "M")	M1	2

Note: R — Reference Number

obtain them with the accuracy you require. You would start with the extreme conditions as you observe them in your plant (you are not concerned with absolute values! E.g. vibration in your plant might be half or ten times as bad as in another plant) and calculate the intermediate values more or less as a straight line function.

It is possible to improve judgment about point values as you go along. In addition you have a very effective means of control in form of the chart, Fig. 1. This graph is based on the assumption that, as a rule, overhaul jobs will be repeated at intervals which depend upon operating conditions.

It is advisable to draw up this chart as soon as feasible at the start of your work on Wear Points. To do this, you use the worst operating conditions in your plant and the corresponding interval between overhaul jobs. This gives you the starting point of the hyperbola. Then you extend the curve backward.

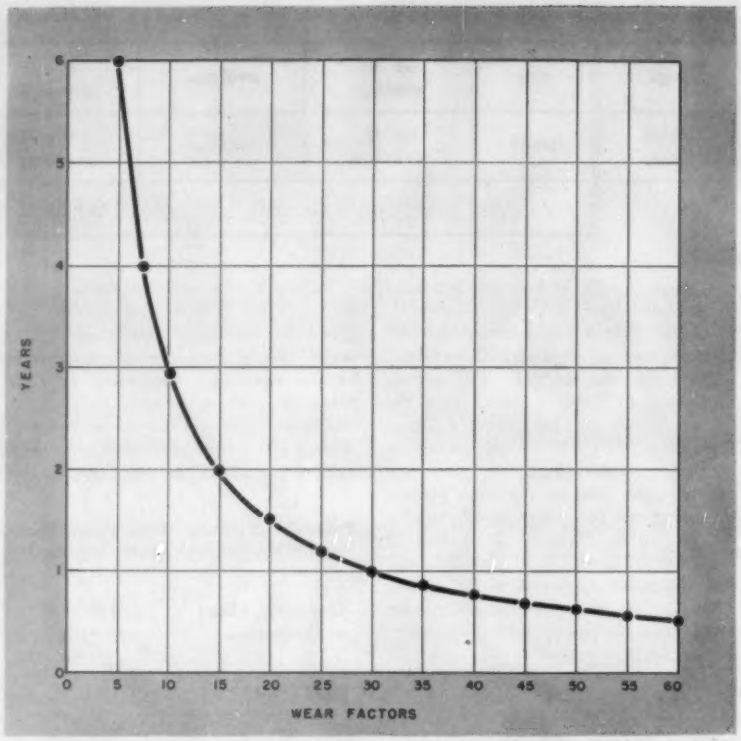


Fig. 1. This chart is used for checking Wear Factors against intervals of overhaul jobs and, for setting intervals for overhaul when Wear Factors are known

Calculating Wear Factors

As soon as you have your Table of Wear Points, you are ready to calculate Wear Factors. You select the Wear Points applicable (Table II) and multiply them by each other. Example:

Reference No.	Wear Points
C 2	1.1
H 2	1.4
U 1	1.2
L 4	3.6
V 4	4.0
Wear Factor	26.6 say 27

Wear Factors should be calculated for everything that is taken care of under the maintenance budget providing maintenance costs can be expected to be a decisive factor when the question of replacement arises. This includes components of large machines, floors, etc., for which history cards would be needed from now on. However, if you have several units of the same type, such as the same kind of pump, working under similar conditions, you would need the Wear Factor for the type only.

As soon as you have all Wear Factors, it is a simple matter to add them up and to divide them by the number of Wear Factors which results in the average Wear Factor. Then you would divide the individual Wear Factors by the average Wear Factor. This gives you the Wear Ratio.

How Do We Calculate the Limits?

Next, we calculate a constant for all units. If your yearly budget amounts to $30,000 and the total invested in all units to $500,000, we calculate

$$\frac{\$\ 30{,}000}{\$500{,}000} \times \frac{2}{12} = 0.01$$

which is the average dollar you can spend ($30,000) per dollar invested ($500,000) divided by 12 to arrive at a monthly figure and multiplied by 2 because of our assumption that, on the average, the limit will be reached when maintenance costs are double the average maintenance costs. Now you are ready to calculate all limits. See Table IV.

Example: Unit No. 1 as shown in Table IV, has a value of $17,500 and a Wear Ratio of 0.12. Its limit is calculated thus:

$17,500 × 0.01 × 0.12 = $21.00

The limits should be written on the history cards and the clerk in charge of them should be instructed to inform the plant engineer whenever a limit has been reached. The latter would investigate to see if maintenance costs

Table III. In order to adjust the present value of a machine purchased some time ago, it is well to adjust the original price according to the present purchasing power of dollar. Numbers based on period from 1935 to 1939 which equals 100

Year	Index No.	Conversion Factor	Year	Index No.	Conversion Factor
1935	98.1	1.96	1945	128.6	1.49
36	99.1	1.94	46	139.5	1.38
37	102.7	1.87	47	159.6	1.20
38	100.8	1.90	48	171.9	1.12
39	99.4	1.94	49	170.2	1.13
40	100.2	1.91	50	171.9	1.12
41	105.2	1.82	51	185.6	1.04
42	116.6	1.65	52	189.8	1.01
43	123.7	1.55	53	191.3	1.00
44	125.7	1.53	54	192.1*	1.00

*estimated

Example: A unit bought in 1944 might cost, in 1955, about 50 per cent more. If you cannot locate the original price or if you wish to establish the price of a component such as a floor, you may have to approach suppliers or contractors.

may be expected to stay over the limit or not. It is possible that a large repair bill was caused by lack of proper spare parts or for other reasons. If he is satisfied that maintenance costs will stay over the limit, the decision about replacement must then be made.

1—The clerk reports about a measurable fact which is easy to observe as part of his normal routine;

2—The plant engineer investigates the technical aspects of the situation and reports to

3—A higher executive who will make the final decision taking into consideration the company's financial picture.

Data for Replacement Program

Let us assume that your history cards have been in operation for some time. Then, as soon as all limits have been entered, it would be advisable to take an inventory of the situation as follows. First you would ear-mark all history cards where maintenance costs were already over the limit. The number of these cards relative to all cards is of some interest, however, more important are these control figures:

1—Total maintenance costs as per last entry minus total of all limits on cards where maintenance costs are over the limit;

2—This difference relative to the budget.

These figures would show you your position as to obsoleteness and how much extra money you have to spend to keep obsolete units in operating condition.

Accelerating Replacement

If you wish, you may break this inventory down into groups of machines so that the need for special effort to accelerate replacements could be substantiated. It seems to be advisable to repeat such inventories at regular intervals and to report the findings to top management since this data should assist them in making decisions about replacements and the corresponding budget.

Obviously, it would be an ideal situation if your company could afford to eliminate all obsolete units. You may be able to accomplish this too in a systematic manner. Because it takes time to get replacements after finding out that a limit has been reached, you would have to overcome this lapse of time.

Lapse may be eliminated by lowering the limits to a certain extent so that action could be taken earlier. However, such steps should be taken with great care and only after thorough investigation. Otherwise you may dispose of numerous units which are not to be considered obsolete at all.

Table IV. This is a specimen table showing how you might go about setting up a similar table for equipment in your plant which might come under this system

Unit No.	Value—Dollars	Wear Factor	Wear Ratio	Monthly Limit—Dollars
1	17,500	4	0.12	21
2	23,500	25	0.74	174
3	45,000	17	0.51	230
4	96,000	49	1.46	1,400
5	105,000	65	1.93	2,025
6	67,500	28	0.83	560
7	48,000	36	1.07	513
8	65,000	55	1.64	1,066
9	10,500	44	1.31	138
10	22,000	13	0.39	86
	Total 500,000	336		6,213
			Average 33.6	

Here's an Example:
Let's Look At Anyplant, USA

NOW LET'S TAKE a tour around a hypothetical plant containing a mixture of old and new machines. Here we will have an opportunity to practice the job of calculating limits. These units are listed in Table V and we shall refer to this table as we go along.

First, we see an electric crane (Unit 1) which is already pretty old but still in good condition. It is not exposed to any corrosion or abrasion, therefore we can give it C1 — 1 Wear Point (see Table of Wear Points, Table II.) It is used on a one-shift basis, therefore we take U1 = 1.2. It has to carry large castings—beds of engine lathes for instance—which are sometimes dropped to the floor in a rather careless manner—consequently we have to allow for repeated shocks: L4 = 3.6. For the same reason we have also to allow for severe impact: V4 = 4. If we multiply these Wear Points with each other, we find a Wear Factor of 17.

We will assume that this plant has the same average Wear Factor 33.6 which we had in our previous example. Therefore we arrive at a Wear Ratio of 0.51 (17 divided by 33.6) and—using the same constant 0.01 as previously—at a limit of $92.00 ($18,000 × 0.51 × 0.01 = $92.00). A glance at our chart, Fig. 1, shows us that the crane should receive an overhaul job every two years which sounds reasonable. The costs of overhaul jobs have to be prorated, in this case over two years.

This crane is a rather expensive piece of equipment, therefore the limit is relatively high and the danger that maintenance costs may go over the limit relatively remote. Actually this crane might be good for 20 years. At that time it might become extremely difficult to get spare parts and maintenance costs might get over the limit.

The next piece of equipment which we see is a platform scale (Unit 2) for weighing hand trucks and lift trucks which go over the platform like a hurricane. A lot of dirt falls into the pit, therefore we have to allow C3 = 1.5 for contamination. It is also used on a one-shift basis, therefore U1 = 1.2. L4 and V4 are needed because of the rough treatment the scale has to endure. We find that it should be overhauled once a year and that the limit is $39.00 which might be reached rather soon. After all this is a measuring instrument which should be treated as such.

Opposite to the scale we find a draw bench, (Unit 3) a beautiful piece of machinery with a 150 hp motor, for drawing aluminum rods. This draw bench and a punch press are the only machines that have to be kept on a two shift operation. Because of the high stresses this machine has to endure, we allow H3 = 1.6. Perhaps we should also allow V3 instead of V1 for impact providing the rods break sometimes during the drawing operation. The limit of $111.00 looks high, but it is worthwhile remembering that we set the limit not because we expect

to reach it under all circumstances. We only want to know when we reach it. Many machines will never reach it and will be replaced for other reasons. So, if a limit looks high, you should not be disturbed. Or are you disturbed if you pay thousands of dollars for fire insurance year-in and year-out without ever having a fire?

The next machine we find is a compressor (Unit 4) which is new, subject to some corrosion, (C2 = 1.1) and continuous fluctuation of its load, (L3 = 2.4), since it is switched on and off every few minutes automatically according to the air pressure in the tank which it fills. We figure that it should receive an overhaul job every two years and that its limit is $71.00 which sounds reasonable.

At this time it should be mentioned that it is advisable to define with figures or examples what the different expressions such as "small," "medium," etc. mean to you. These definitions should be kept in a manual or in form of standard practice instructions.

And now we come to a punch press (Unit 5) which is already pretty old and requires plenty of maintenance. This is partly explained by the fact that it has to work on two shifts. You can see that it is subject to considerable wear (Wear Factor 60) and that it has to be overhauled every six months. (Actually, there is not time enough to do this thoroughly, so, it might go over the limit any moment).

And now we see there an exhaust fan (Unit 6) which is needed to get rid of all kinds of corrosive fumes. Unfortunately, they had to buy a war product which was not built of the material most suitable to do this job. Therefore we have to assume that the fan will wear much faster (M1 = 2). The selection of the other Wear Points should be clear. The interval between overhaul jobs and the limit seem to be reasonable, however, it is surprising that the fan didn't go over the limit a long time ago.

Another piece of equipment that cost plenty in repairs during the war years and which should have been replaced a long time ago is the motor (Unit 7) which drives the rolling mill in front of us. The rolling mill was overloaded most of the time and the motor didn't like this at all. Because it is not suitable for the load, we allow M1 = 2. The other Wear Points are self explanatory. The motor has been over the limit for five months, will be replaced in conjunction with the installation of a new rolling mill.

The pipe line (Unit 8) which is suspended in the air over the yard is used for some corrosive, abrasive and contaminated material which is tough on the pipes. What it is, I cannot tell

Table V. This is table compiled by author on his imaginary trip around plant

Unit No.	Name	Year Bought	Age—Years	Price, Dollars— origin.	adjusted	Wear Points	Wear Factor	Wear Ratio	Overhaul interval years	Maint. Cost Limit—Dollars
1	Crane	1947	8	15,000	18,000	C1 1.0 U1 1.2 L4 3.6 V4 4.0	17	0.51	2.0	92
2	Platform Scale	1951	4	5,000	5,000	C3 1.5 U1 1.2 L4 3.6 V4 4.0	26	0.78	1.0	39
3	Draw Bench	1945	10	25,000	37,000	C1 1.0 H3 1.6 U2 2.6 L3 2.4 V1 1.0	10	0.30	3.0	111
4	Compressor	1955	new	1,200 cap. & head 2x	1,200	C2 1.1 H2 2.8 U1 1.2 L3 2.4 V2 2.0	18	0.54	2.0	7
5	Punch Press	1941	14	3,500	6,400	C1 1.0 H3 1.6 U2 2.6 L4 3.6 V4 4.0	60	1.80	0.5	115
6	Exhaust Fan	1945	10	300 cap. & head 2x	450	C3 1.5 H2 2.8 U1 1.2 L1 1.2 V2 2.0 M1 2.0	24	0.71	1.0	3
7	Motor for rolling mill	1935	20	17,000	34,000	C1 1.0 H3 1.6 U1 1.2 L4 3.6 V4 4.0 M1 2.0	55	1.50	0.5	510
8	Pipe line	1952	3	500	500 2x	C3 4.5 H2 2.8 U1 1.2 L1 1.2 V2 2.0	36	1.10	0.75	6
9	Boiler feed pump, recipro-cating	1940	15	350	570 cap. head	C1 1.0 H1 1.2 H2 1.4 U1 1.2 L3 2.4 V3 3.0	15	0.45	2.0	3
10	Universal Milling Machine	1955	new	25,000	25,000	C2 1.1 H3 1.6 U1 1.2 L3 2.4 V3 3.0	15	0.45	2.0	112
11	Factory Floor, Aisle A			1,000	1,000 cap. press.	C2 1.1 H2 1.4 H3 1.6 U1 1.2 L3 2.4 V3 3.0	21	Abrasion 0.62	1.5	6
12	Factory Floor, Aisle B			1,000	1,000	C3 1.5 C3 1.5 H3 1.6 H3 1.6 U1 1.2 L3 2.4 V3 3.0	66	Abrasion Corrosion capacity pressure 2.0	0.5	20

you. This plant is working on a secret project. We have to allow three times C3 = 4.5 and V2 = 2.0 because the pipe line sways in the wind.

And now let's go into the boiler house. There you can see a good, old, reliable piece of machinery, the boiler feed pump (Unit 9), 15 years old and still good. The fireman takes good care of it, therefore, they need rarely any spare parts or repairs to be done by the machine shop. The load the pump has to carry is small (H1 = 1.2) and although we allow L3 and V3, the limit is only $3.00.

No-Wear Fire Pump

Talking about pumps: they also have a fire pump which they test once a year but don't use otherwise. Consequently there is no need to calculate a limit and intervals of overhauls. This is one of the few exceptions you may find.

Finally I want to show you an outstanding machine, a universal milling machine (Unit 10) which cost $25,000. We allow C2 = 1.1 for slight corrosive effect of some cutting fluids, H3 = 1.6 for high stresses, L3 = 2.4 for continuously fluctuating load and V3 = 3.0 for medium vibration. With these Wear Points we obtain a Wear Factor of 15, a two-year interval between overhauls and a limit of $112.00.

This machine like many other machine tools may never be replaced because of excessive maintenance costs but because a machine with higher output will take its place. Such machines are now available on a rental basis and the question may come up whether such machines too should be included in your set-up of limits. This seems to be advisable even if you get no other benefit but a complete listing of all wear factors so that you may obtain a reliable average wear factor.

Another advantage would be that, in case of any large repairs, you would have less trouble in evaluating the situation. Perhaps you are familiar with the MAPI formula which is used to make a complete analysis whenever replacements of machine tools are contemplated. In this formula, maintenance costs are only one of numerous factors which have to be considered. Our system, on the other hand, has the predominant purpose of detecting when maintenance costs become excessive. If this is the case, all the other pertinent facts should be investigated too as outlined previously.

By the way, we didn't separate any single component of the units to be treated as individual units. However (for example), if the hoist motor of the crane should cause much trouble, it would be a good idea to give it an equipment number and history card. Its Wear Factor, Wear Ratio and interval between overhaul jobs would be the same as for the crane, but, since the value of the motor is only $1,500, its limit would be $1,500 × 0.51 × 0.01 = $8.00 which is relatively low. Therefore, it is conceivable that the motor, the most vulnerable component of the crane, might go over the limit much earlier and more often than the crane itself. If you didn't treat it as a separate unit, you might not become aware of the fact that you were carrying excessive maintenance costs.

Well, we have to go back to the office, but, please, watch your step. Aisle A (Unit 11) is in bad shape. It should get an overhauling. Our Table of Wear Points was not designed for this particular application, but it may give us a fair idea about the application of Wear Factors and Wear Ratios. Because the lift trucks going over this aisle have solid rubber tires which are sometimes quite bumpy, we allow V3 = 3.0 for medium vibration; other points are self explanatory.

On the next aisle, Aisle B (Unit 12), alongside the pickling tanks we have heavier traffic. Correspondingly the Wear Factor is higher. The calculated results might be good enough for the conditions in question. The original cost of these aisles was relatively low and it does not seem to be worth while going into extensive investigations about ton-miles and other data to arrive at more accurate results. However, under different circumstances you may have to do this.

Our tour through the plant covered a great variety of units and should have given you confidence that it takes little time to set Wear Factors, Wear Ratios, and so on. One reason is that the choice of degrees on the Table of Wear Points has deliberately been restricted as much as feasible. It is advisable that you do the same on your table. There is no advantage in breaking it down finer unless you have the means of measuring the operating conditions with corresponding accuracy.

Specific Questions and Answers

Q. The total monthly limits in your example, Table IV, amounts to $6,213 while double the monthly budget is only $5,000. Shouldn't these two figures be identical according to one of your basic assumptions?

A. It would be a coincidence if they were identical; e.g. if Unit No. 5 had a Wear Ratio of 0.77 and a limit of $812.00. The total monthly limits can be higher or lower than double the monthly budget depending upon the incidental values, Wear Factors and their distribution around the averages. Any discrepancy of this kind has no practical importance. In particular, if your total monthly limit is higher than double the monthly budget, this does not mean that your budget is too low. It means that, if your company would stop buying new machines etc., and all machines would reach the limit simultaneously, you would require double the monthly budget. This, apparently, is not a practical case. The limits do not tell you what to spend but when to stop spending. The budget, on the other hand, tells you also in a sense what to spend. And you can live within your budget only if you make certain replacements when needed and if you stop spending money on obsolete units.

Q. What is the reason for your basic assumption that the limit is reached when, on the average, maintenance costs become double the average maintenance costs?

A. The system deals with innumerable units in innumerable enterprises and there are no statistics available against which to check this assumption. However, this assumption looks reasonable to start with. If you believe that you should set your limits differently, you are free to do this. Perhaps, as we go along, plant engineers will publish their experiences with the system and we may be able to modify it to suit the requirements of various groups of enterprises.

Q. How do you use the system for setting up budgets for groups of units?

A. You take the total of monthly limits for the group in question and express it in per cent of the total of all limits. Then you multiply your budget with this percentage which gives you the group budget. Still, you should make sure that the group is about average in regards

to the factors outlined in the next answer. Otherwise it might require more or less than the average maintenance dollar per dollar invested which is one of the factors determining the limits. For example, you may have a group which is extremely difficult to maintain because of poor accessibility. Another group might cost very little because the units are mostly new. Perhaps you can make allowances for that, otherwise you cannot calculate the group budget.

Q. Why can't the system be used for establishing a maintenance budget?

A. Your budget—unless it was set up quite arbitrarily—is the answer to a great complex of problems of which values of units and their operating conditions are only a small part. Your budget depends upon the requirements of your production departments; the efficiency of your maintenance system and crews; physical condition of units and replacement policy; cost of maintenance material and labor; physical condition of your production machinery and equipment and the quality of the personnel handling them; your Company's policy as to replacement of production machinery etc. The system, on the other hand, has been designed exclusively to answer the question when maintenance costs become excessive. It is using the average maintenance dollar per dollar invested as a given figure without questioning its validity, but it could not determine it solely from values and operating conditions.

Q. When do I have to change the limits and how much work is that?

A. Limits should be changed under the following conditions:

1—Whenever operating conditions change substantially and permanently.

2—If the budget should be changed substantially and permanently, independent of a change of purchasing power of the dollar.

You are the judge to decide what is substantial and permanent. These are relative values depending upon conditions. To change the limits may take a few hours.

Q. What is the reason for your statement that I do not have to change limits when the purchasing power of the dollar changes?

A. This is not to be expected because we are using in the constant (in our example 0.01) the ratio between budget and investment, $\frac{\$30,000}{\$500,000}$. If the budget has to be changed because of changing purchasing power of the dollar, it may be assumed that the replacement cost for the units in question would change approximately in the same proportion. Consequently, the ratio would remain about the same.

Q. You mentioned that the system could be used for setting up priorities of preventive maintenance work. What does this mean?

A. Under a preventive maintenance system you would probably give the highest priority to work on units of critical importance. That is, to units the breakdown of which would cause an immediate loss of production. Next, you would choose units the breakdown of which would cause a loss of production after a certain lapse of time. For the rest of the units you could use the limits as a measure of priority. The higher the limit the greater the need for keeping the unit in good repair. However, you could also combine the idea of limits with the other priorities. If you have several or many units of first and second priority, you could handle them in sequence of limits. Thus your maintenance work should become more efficient.

Q. This conception of priorities according to limits would mean that I have to give preference to units even if they are nearly at the limit or scrap value. This does not make sense to me. Shouldn't maintenance expense drop with the value of the unit?

A. This question is partly answered by the fact—with which you are quite familiar—that normally maintenance expense increases with the age of a unit. But it does not increase automatically. It increases because you want to keep the unit in operation despite its age and physical condition. To reduce maintenance while a unit gets older would only accelerate its deterioration. In other words, as long as the unit is useful to your operations, you would keep on spending money to keep it in good condition irrespective of the fact that its market value is getting lower all the time—up to a point! And this point is the "limit", Table I.

So Plant Engineering's Editorial Staff

"Would a System

Whenever a problem — or purported solution — arises in the plant engineering scope of activity, on which there has been no previously recorded experience, the editors of Plant Engineering go to its readers for their considered opinions. Such was the case with Mr. Margo's method for determining excessive maintenance costs. The answers are printed here; some are favorable, some unfavorable, some are undecided.

Best Approach Seen to Date

"I HAD THE ARTICLE enclosed in your letter of 25 May on *Maintenance Costs* by Mr. B. A. Margo, reviewed by several of our people in the Maintenance and Materiel Group. In general, the article has provided us with a new approach for evaluating maintenance costs, particularly in the facilities area.

"We are doing about the same thing now in our transportation program. Our transportation dispatch control card keeps record of cost of maintenance of a particular vehicle for the year. We have not, however, in attempting to arrive at an economical maintenance replacement figure given enough consideration to the different 'wear points'; that is, a dump truck hauling coral on the Island of Kwajalein is going to require considerably more annual maintenance and justifiably so, than a similar dump truck hauling loam at Jacksonville.

"Following are quotes from comments submitted:

> "'In general this article presents the best approach I have seen to date on the question that is continually being presented, i.e., How do you know when maintenance costs are excessive? What I like about it is that it departs from the 'bookkeeper' approach and takes into consideration those items that all plant engineers know must be considered—such as, usage, and other operating conditions. The system outlined should be of great value in evaluating and analyzing our facility history records when these data become available, therefore I believe we should definitely consider this article for one of our future refinements, and give it a tryout after we have implemented our present Controlled Maintenance Program (including Job Analysis), and our facility history records are in full operation.'
>
> "'1. How you feel about its pos-

Asked Its Reader "Board of Judges"—

Like This Be of Help In Your Plant?"

sible application in the average plant.'

"'Ans. I believe its application would be invaluable at an average *production* plant, where production machinery and equipment represents the greatest maintenance effort. In a military establishment where roads, grounds, waterfront structures, buildings, etc. represent the area of the greatest maintenance effort its application would not be quite as valuable, but with modifications it could be made a valuable and important management tool.'

"'2. In what manner this system could be improved.'

"'Ans: Table of wear points requires considerable expansion to make it applicable to the items noted above (roads, waterfront structures, etc.) but this should not be difficult if the same basic principles are considered.'

"'3. Any other comments you might care to make.'

"'Ans. I consider this article the most practical approach seen to date on the problem of how to determine what proper maintenance costs should be. As noted in the preface this system takes into consideration actual practices which every plant engineer follows instinctively. In this it is probably unique because heretofore most attempts to determine the propriety of maintenance costs have been from a statistical or bookkeeping view point, which is grossly inadequate.'

"I have not had a chance to study the article as closely as the person making the comments above. It may be after more study and re-reading the article, I would subscribe to the comments wholeheartedly; however, at the present time I would have to temper my comments somewhat."

E. J. Peltier
Captain (CEC) USN
Bureau of Yards & Docks

Ingenious, But Doesn't Attack Real Problem

"THANK YOU for forwarding the preprint of Mr. Margo's system for detecting excessive maintenance costs.

"Although his idea is ingenious and quite impressive, I don't believe it really comes to grips with the real problem underlying maintenance cost control. I've observed a tendency on the part of those seeking the answer to maintenance costs to look for a formula rather than depend on direct individual observation by those responsible for maintenance.

"Mr. Margo's system presupposes the existence of a detailed record of the actual cost of maintaining each major item of equipment or category of service. It amazes me to learn how many engineers don't have such a record and can't see the value of one. It is my conviction that if a plant has a workable system of recording such costs, the management can well afford to make it an official function of a responsible engineer to review the records on a systematic basis. If this is done, I see no need for any elaborate method of indexing the costs.

"The Wear Point system appears to be a method of apportioning a predetermined budget on a quasi-logical basis tied to the *relative* values of arbitrarily applied factors and the equipment cost. Before the resultant maintenance cost 'limit' could be presumed to reflect the proper true cost, I am sure the factors would have to be revised several times on the basis of experience.

"It seems to me that one danger of the proposed system is that everyone might be entirely happy and content to operate with costs below these 'limits' and, in doing so, overlook a world of opportunity for economies.

"In my opinion all maintenance costs should be considered to be excessive until a factual study is made of every maintenance operation. Only when the responsible supervisors have made these studies, or have had them made, can they safely assume that their costs are below the 'excessive' level. They should be able to prove that every one of the following conditions has been satisfied:

"1. All practical steps have been taken to make the equipment adequate for the job it is doing. (Care must be taken not to over-design. It costs money too!)

"2. A proper amount of preventive maintenance attention is carried out. (This can be overdone too!)

"3. Every repair is studied to see if a repetition of the failure can be avoided by making some practical improvement.

"4. The operators aren't abusing the equipment.

"5. The maintenance mechanics are properly supervised and do their work promptly with a minimum of lost motion and indecision.

"In the final analysis, the economics of replacement vs. continued use should be governed largely by the degree to which new equipment will actually reduce the unit cost of manufacturing the product. This must include consideration of productivity, maintenance and amortization. Usually, when maintenance is the only consideration, (unless the old machine is completely worn out) the proposed new machine must be of improved construction in order to show any appreciable reduction in maintenance cost, and frequently the same improvements can be made in the existing machine at less cost than an outright replacement.

"Mr. Margo's example of the crane motor illustrates what I consider to be the basic weakness of his approach. To determine that the motor should be segregated required a study of the records. Unsatisfactory packing on the shaft of an otherwise perfectly suitable pump, unsuitable valves in an otherwise perfect compressor, an inadequate method of lubricating an otherwise adequate bearing and so on, are other examples of sources of unnecessary maintenance costs which could go on undetected by his system.

"It is time to replace any machine, regardless of its age, when its total operating cost per unit of production including maintenance, depreciation, operating labor and power consumption, exceeds the corresponding costs expected of the new machine by enough to write off the old machine's unamortized value within a reasonably short time. (How long 'reasonably short' should be can only be determined by management in the light of their plans for the particular product).

"I will be much interested in the comments of others on this system. Possibly they'll see a more tangible value in it than I have."

F. McDermoit
Plant Engineering Supt.
Lever Brothers Company

System Calls Attention To High Costs, Investigation

"I APPRECIATE the opportunity to review the article 'Maintenance Costs—do you know when they're excessive.' I was much interested in this subject since we have machine record cards on most of our equipment. Mr. Margo's system appears at first to be a worth-while addition to these cards. He has a good idea and I am glad he has passed it along to others by writing this paper.

"This article places a lot of emphasis on replacing a machine when the maintenance costs reach a predetermined value. I believe this system serves better to bring to attention when the costs are high and thus cause an investigation to determine the reason. Usually the trouble can be found and corrected without replacing.

"We find that to justify the replacement of a machine, we must consider its book value (amortization) plus the cost of a major repair or overhaul. Maintenance costs alone very, very seldom justify replacement. I believe that when maintenance costs alone are sufficient, then the replacement will *not* be a duplicate new machine, but instead a better, different type. This type of replacement is usually quite evident to production and to maintenance since it means a lot of down time and this hurts deeply and is quickly brought to the top by everyone without an analysis of maintenance costs. Down time is many more times expensive than just the maintenance costs.

"Table I assumes that as a piece of equipment gets older, the maintenance costs will continue to rise. I believe that with proper maintenance, month by month, the maintenance cost of a new machine will rise fast the first 5 years and then gradually level off. Somewhere along this curve, an expensive major repair will be necessary, or maybe it might be a general overhaul; the decision to replace must be analyzed *before* this large cost appears on a record card. Here is when the book value, the cost of the repair job and the fact as to whether the machine will then be satisfactory are all considered against replacing. Often times the repair is still necessary to keep pro-

(Continued on page 192)

Fig. 1. and 2. Above: Rotary tiller enables one person to accomplish in three days the necessary soil-preparation work which formerly required the efforts of five or six men for two or three weeks. Right: Power sprayer, with 15-gal reservoir, dispenses several types of herbicide to kill weeds

Grounds Maintenance—
Mechanization Reduces Operating Costs

By R. F. WILLIAMS, Manager of Plant Security and Grounds, Abbott Laboratories, Inc.

MECHANIZATION has substantially cut the cost of grounds maintenance at the sprawling North Chicago, Illinois, plant of Abbott Laboratories, Inc. Thanks largely to machines, a five-man crew is able to take care of about 12 acres of lawn, flowers, shrubs, and trees; formerly an eight-man crew was needed for the job. Grounds maintenance costs have been cut an estimated $3,000 a year by transferring three seasonally-employed gardeners to other jobs.

Perhaps the best example of the benefits worked by mechanization is the rotary tiller the firm uses for soil preparation. As soon as the ground thaws in spring, the rotary tiller turns over lawn and flower beds, plus areas around trees and shrubs. This work used to require the efforts of five or six men, using shovels, who had to work at it full-time for two or three weeks. Using the rotary tiller, one man is able to accomplish the same task in three days.

A special fertilizer mix, composed of nitrogen-rich fumigillin and calcium-rich bone-ash, both byproducts of the firm's manufacturing operations, is laid down with a 36-in. wide seeder, mounted on rubber tires and operated by hand. Thanks to an automatic dispensing device on the seeder, the amount of fertilizer laid down can be closely controlled and there is a minimum of waste.

The seeder also dispenses cyanamid, an all-purpose herbicide that is used about three weeks before seeding. About five pounds are required for every 100 sq ft.

A power sprayer handles the rest of the weed-killing job. This unit, powered by a 1½ hp gasoline engine, is equipped with a 15-gal spray reservoir. It delivers 2 gpm of spray through a 45-ft hose. Du Pont's Telvar W is dispensed along fences, streets, parking areas, and railroad tracks to eliminate grass and weeds in locations where expensive handcutting would be necessary.

Generally, this herbicide is applied in a 2-ft belt along fences and the edges of streets and parking areas, and to the entire railroad right-of-way. Proportions are one cup of Telvar W powder to five gallons of water. Twenty to 60 lb of the herbicide are needed per acre. Applied shortly before growth starts, one treatment lasts the entire growing season.

Two-4-D chickweed herbicide is sprayed over the lawn at two-week intervals until the weed is gone. This treatment, although it doesn't prevent the recurrence of chickweed trouble every year, usually removes the prob-

Fig. 3. Electric trimmer cuts hedges in fraction of the time formerly required

lem in comparatively short order. One ounce of Two-4-D mixed with one gallon of water covers about 250 sq ft. A five-nozzle boom attachment on the sprayer lays the herbicide over the lawn.

For removal of crab grass, we use a spray composed of two teaspoons of potassium cyanate to five gallons of water. This amount covers about 260 sq ft. It is applied during the latter part of June to kill crab grass seeds just after they have begun to grow. Our gardeners have found that a good mat of lawn can be an effective deterrent to crab grass. By cutting the lawn to a minimum height of one and one-half inches the chance of creating bare spots, where crab grass can propagate easily, is virtually eliminated.

A lawn mower, equipped with a seat for the driver, covers the grounds once a week. The seat makes it possible for the operator to work as fast as the machine. As a result the lawn can be cut about 25 per cent faster than formerly, when another power mower was used which required the operator to walk instead of ride.

Warehouse Grounds Care

The remaining 10 acres of grounds presently maintained by the firm are situated around a warehouse a few miles away. There are few visitors at the warehouse, and to cut maintenance costs, that area has been planted with an 85 per cent rye grass, 15 per cent blue grass mixture. Annual replanting is unnecessary, other grasses taking over when rye grass dies off. Only care required is to cut the grass.

For this job, a hammerknife mower is used. Attached to the underside of a tractor (also used for snow removal, and for hauling gravel to repair holes in parking lots, etc.) the unit slices the grass into lengths a few inches long. Since rye grass grows rapidly, this treatment soon provides a thick cover at low cost.

The Abbott grounds include about 200 trees—mostly elms, maples, and flowering crabs ranging from five to 50 years old. Occasionally, when trees do not grow properly, a Ross Nutrient Cartridge is used to correct the situation. The cartridge, containing soluble fertilizer, is placed in a three-foot long metal tube with a well-point at the bottom. Then, a lawn hose is connected to the upper end of the tube. Water, passing through the cartridge, dissolves the fertilizer, and carries it into the ground where it feeds into the tree roots. To help the tree further, the soil around the base of the trunk is turned over, and twice the normal amount of fumigillin-bone ash fertilizer is placed on surrounding grass covering the area the branches reach.

The grounds department has charge of about 2,000 shrubs, many of them in hedges around plant entrances and sidewalks. Lilacs, honeysuckle, Philadelphus, and viburnum are among the shrubs included. Once a month, hedges are trimmed with an electric trimmer which has a 200-ft extension cord. This trimmer accomplishes the job in a few hours, an estimated three to four times faster than when trimming was done with hand-operated shears.

Floral Planting

Flower plots contain some 10,000 annuals and 10,000 perennials. In the former group are petunias, snapdragons, asters, and Ageratum, and in the latter, phlox, peonies, iris, daisies, chrysanthemums and sedum. Rows in each flower bed are spaced 18 to 24 in. apart to provide room for the rotary tiller.

About 200 ft of soaker hose is needed to water these flowers. The plastic hose replaces a similar length of canvas hose formerly used. The new material stands up much better after being dragged across sidewalks and pavement and subjected to the other abuses that occur during the normal course of grounds maintenance operations.

About 1,200 ft of lawn hose are required for the Abbott grounds. This consists of 18 50-ft lengths of hard rubber hose, and four 75-ft lengths of plastic hose. The plastic is about half as heavy as the rubber, permitting one man to carry more at a time. Rotary sprinkler heads, which cover a circle of lawn 25 ft in dia, are used.

Fig. 4. View near main gate of Abbott Laboratories shows firm's well-kept grounds. Ground crew takes care of 12 acres of lawn, flowers, shrubs and trees

Fig. 1. Everywhere you look at Dravo's Neville Island plant, beauty blossoms forth. Here, employees walk between buildings set amid pleasant surroundings

Dravo Corporation Wins Industrial Landscaping Award

Fig. 2. R. W. Hiller, plant engineer, Dravo Corp., right, receives national award from Valleau Curtis, director of American Association of Nurserymen

BECAUSE OF the striking combination of beauty and utility at its Neville Island plant, Dravo Corp., Pittsburgh, won a national "Plant America" award.

The award, made by the American Association of Nurserymen, was recently presented to R. W. Hiller, Dravo plant engineer. The citation reads:

"In recognition of achievement in industrial landscaping and beautification contributing to employee and civic pride in our American heritage."

Eight acres, known as Dravo Park, are located in the center of the firm's 65-acre industrial plant area which contains shipbuilding installations, steel fabrication shops and other heavy industry units.

The park area includes a swimming pool, company cafeteria, swings, horseshoe and shuffleboard courts, outdoor fireplaces and picnic facilities. Landscaping features include trim lawns, concrete walks, sculptured shrubbery, trees and huge flower beds.

The company employs a full-time gardener the year around and provides him with a helper throughout the summer.

Dravo Park is used for many activities. Employees relax there during summertime lunch hours and the an-

Fig. 3. Shown on this page are several views of Dravo Park. You can see why the company won a national award

Fig. 4. Dravo Park not only has beautiful landscaping, it also has a swimming pool, outdoor fireplaces, picnic grounds

nual company picnic is held here. It also is the scene of various company athletic events such as softball and football games.

Church and civic groups use the park for picnics as do the various company organizations.

The pool is one of the most popular spots in the park. It is opened in the summer to all Neville Island children. Employees use it at night. Built in 1922, its original purpose was to keep the island's children out of the dangerous waters of the Ohio River. It measures 150 by 35 ft and has a capacity of 400 swimmers.

In addition to its many physical attributes, company officials like to think of their park as an intangible asset, too. They feel that its very presence gives a wonderful boost to employer-employee relations within their organization.

Here in the midst of a huge industrial installation, the park stands as a reminder to Dravo's men and women of the changeless and yet ever-changing beauties of nature and their own relationship to it.

Literature on Tree Care

Several books and pamphlets which the Dravo gardener found of interest are listed below in the hopes that other readers may find them helpful.

Trees: The Yearbook of Agriculture 1949. Available from the Superintendent of Documents, Washington 25, D. C., 944 pp $2.00. This volume covers tree identification, pests, diseases and care.

Maintenance of Shade and Ornamental Trees, by P. P. Pirone, 463 pp, $8.00. Oxford University Press. Many experts use this book.

Garden Enemies by Cynthia Westcott, 261 pp, $3.50. D. Van Nostrand Co., Inc. For the amateur, an authentic book on diseases and insects.

Care of Damaged Shade Trees. Farmers' Bulletin 1896. Free from Office of Information, Department of Agriculture, Washington 25, D. C. Primer on tree wounds.

Common Diseases of Important Shade Trees. Farmers' Bulletin 1987. Free from Office of Information, Department of Agriculture, Washington 25, D. C. Disease control for 41 trees.

The following National Park Service bulletins are available from the Superintendent of Documents, Washington 25, D. C.: *Tree Bracing,* 10 cents; *General Spraying Practice,* 10 cents; and *Transplanting Trees,* 20 cents.

Write to your state agricultural experiment station for bulletins on the care of trees in the locality in which you live.

Fig. 5. Swimming pool can be seen in background. It was built to keep children from the neighborhood out of the dangerous waters of the nearby Ohio River

Industrial X-Ray Rooms—
Planning and Equipping Them for Your Plant

By W. R. HAMPE, Supervisor, Products Section
X-Ray Department, Westinghouse Electric Corporation, Baltimore, Md.

THERE ARE THREE general classifications into which x-ray equipment may be grouped:

1. Laboratory units are intended for permanent installation within rooms having lead-lined, concrete or masonry walls, floor and ceilings which act as protection against radiation. In general, these units are used for radiography only.

2. Mobile x-ray equipment, designed to be moved about within a building, between buildings or to outside areas to the part to be x-rayed. In most cases it is used for radiography only.

3. Enclosure units, consisting of lead-lined cabinets containing the x-ray tube, the specimen support, and the x-ray film or fluorescent screen. Equipment of this type may be either fluoroscopic or radiographic or a combination.

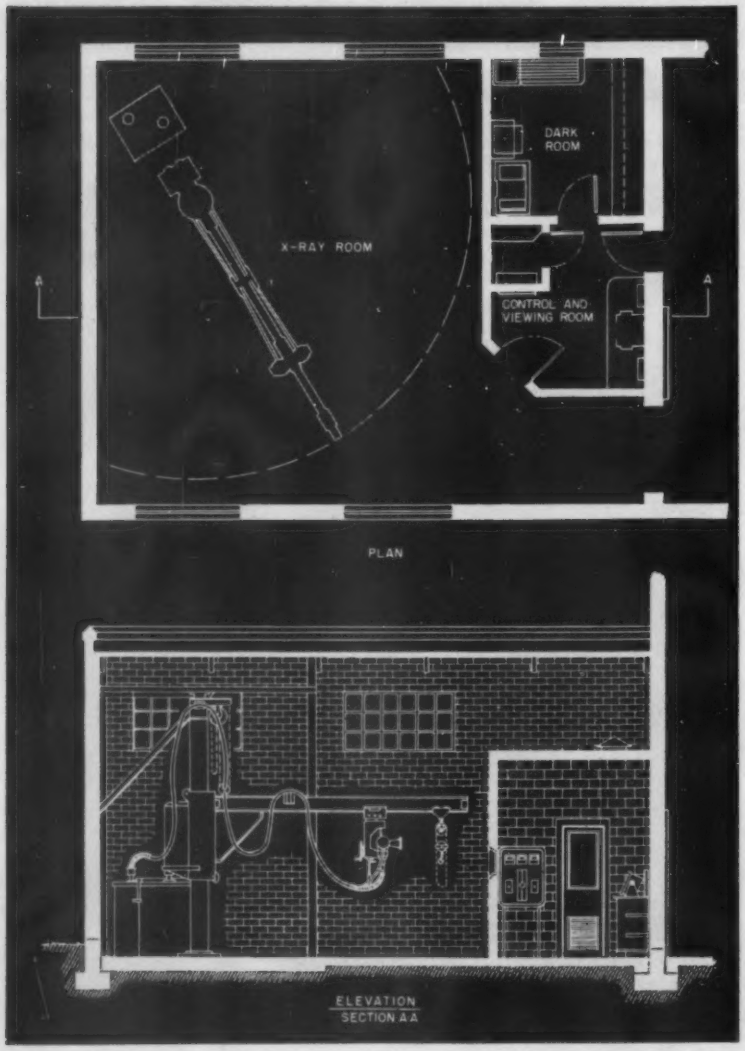


Fig. 1. Simple industrial set-up intended for general utility in a small plant. With this arrangement one person performs all work including x-ray exposure

Table I outlines the advantages and disadvantages of each of these types.

Since the penetrating power of the x-ray beam is function of the maximum kilovoltage applied, x-ray equipments are classified popularly as shown in Table II.

The selection of the type of equipment for a particular application is generally made by the plant quality control, metallurgical, or engineering departments.

In a typical manufacturing plant, x-ray equipment could be located logically in any or all of the following places:

1. Incoming inspection, prevents defective material from reaching the production line, and enables the purchaser to return the defective material to the supplier for credit.

2. Experimental inspection, checks experimental or pilot products for faults inherent in the manufacturing procedure.

3. Production culls out mistakes in manufacturing procedure and acts as a check on individual operation or operator errors.

4. Outgoing inspection, prevents shipment of defective material to the customer.

5. Salvage inspection, determines if any of the salvaged parts can be repaired.

6. Service inspection checks the effect of field service on the product. The results may indicate the need for design changes.

Each of these inspection positions may require a separate x-ray unit or one or more x-ray units may perform all of the necessary work. Obviously if only one or two units handle all the work, the problem of laboratory location becomes important. It is also obvious that the importance of the equipment location problem will vary depending upon: (1) installation in a new plant; (2) addition with a new department; (3) addition to an existing department; (4) installation in a production line for a new product.

The problems of layout, building constructions, utilities, safety devices and installation are of a special nature.

In general, the radiographic layout

is divided into five areas: 1. The storage of parts to be x-rayed; 2. X-ray; 3. Darkroom; 4. Reading, film filing and office; 5. Storage for x-ray parts until the inspection report indicates disposition.

Major equipment manufacturers supply information on the minimum layout requirements of their types of x-ray apparatus for the application. This information, in the form of sketches, shows the dimensioned outline of the equipment, the estimated radiation protection needed and the utility requirements. It is the plant engineer's job to fit this unit sketch into his plant layout, Fig. 1.

Figure 2 is a layout of an x-ray department such as may be located in a large aircraft manufacturing plant. In developing this scheme, the following major objectives of plan layout were pursued as closely as practical. 1. Facilitating the manufacturing process; 2. Minimizing materials handling; 3. Maintaining flexibility; 4. Maintaining high turnover of work; 5. Keeping investment in equipment to a minimum; 6. Promoting effective utilization of labor; 7. Making an economical use of floor space; 8. Providing for employees' comfort.

Handling Methods

Parts to be x-rayed may be brought to the x-ray room by conveyors, chutes or overhead cranes. The entrance to the x-ray laboratory should be of sufficient size and still be protective. Where overhead cranes are used, the ceiling of the laboratory should be omitted. If chutes or belts are employed, the entries should be constructed to prevent radiation exposure to personnel outside the laboratory.

Since the vast number of x-ray techniques used prevent a description of each facility needed by the radiographer, consideration should be given to hydraulic jacks, pry bars, jib cranes, jigs and fixtures to facilitate optimum film positioning. On occasion, stamping machines are employed to mark the parts.

The construction of a laboratory x-ray room can be carried out in three ways:

1. *Construction within a plant*—setting aside an area directly on the manufacturing floor. Moderate cost, good material flow.

2. *Construction using part of the plant*—using one corner or one wall of the building. General cost less, but may be out of material flow path.

3. *Construction outside the plant*—constructing a separate building. Most expensive—out of production line but sometimes required for space reasons.

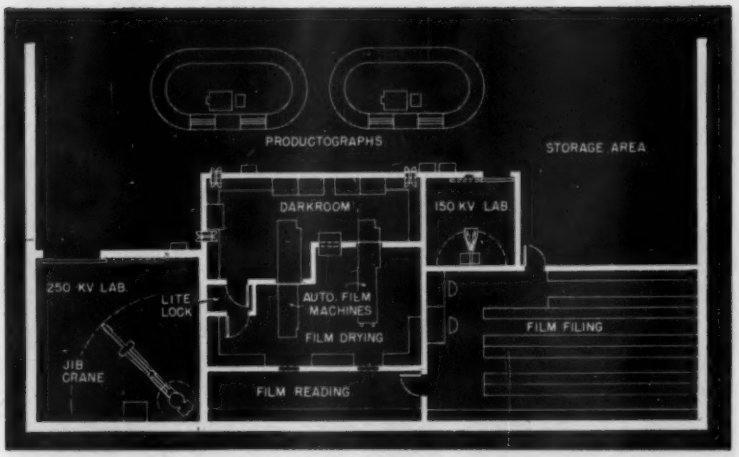


Fig. 2. This is a suggested layout for a considerably larger x-ray department. This one might be located in an aircraft or automotive manufacturing plant

After physically fitting the units into the allotted floor plan area the construction and protective value of the walls, ceiling and floor of the x-ray room should be considered. Protection is obtained from concrete and lead or a combination.

The American Standards Association's "Safety Code for the Industrial Use of X-Rays, Z54.1—1946," describes the various classes of x-ray installation and the safety requirements which should be followed in the construction of a safe installation.

From a radiation protection standpoint, there are three classes of x-ray installations: Class A, or totally protective installations; Class B, an installation where the x-ray beam direction is limited; Class C, which deals with all other types, including mobile and fluoroscopic equipment. Classes A and B each have sub classes for enclosures subject to vibration or wear.

As soon as the location of the equipment is decided upon, and the room construction appears satisfactory, the plans should be submitted to a registered physicist for approval. The x-ray equipment companies or universities have lists of registered physicists. After the completion of the installation, the physicist should make a survey for radiation leakage. His recommendations should be followed to insure safety of the employees.

Mobile Equipment

Mobile units require no special construction provided they can be stored out of the weather. Some users build a laboratory room for parking the unit. Portable protective shields may be required depending upon the application. Mobile darkrooms have been used when the x-ray inspection point is remote from processing facilities. Usually, however, the films are brought to a permanent darkroom.

Protective enclosures can be used

Table I. Advantages and disadvantages, based on eight characteristics, of laboratory, mobile and enclosure types of x-ray equipment generally employed

Equipment	Laboratory	Mobile[1]	Enclosure
Flexibility	Good	Best	Fair
Results Obtainable	Best	Good	Good
Equipment Expense	Moderate	High	High
Installation Expense	High	Low	Moderate
Floor Space Required	Large	No Fixed Amt.	Small
Protection	Good	Moderate	Best
Maintenance Expense	Low	Moderate	Moderate
Specimen Set-up Speed	Moderate	Low	High—Adaptable to automatic operation

[1] Indicates that the x-ray equipment is mounted on a wheeled chassis with a means of supporting and/or positioning the tubehead. Also, included under this heading are portable units which can be manually carried as a whole or in parts. These units differ only in that they have relatively inflexible positioning devices for the tubeheads and in some cases, a 1200 cycle power source may be required rather than the normal 230 volt, 60 cycle, single phase, a-c line.

Fig. 3. It is sometimes desirable to place the fluoroscope and radiographic cabinets directly in the production line, to speed output and lessen handling, as shown

for fluoroscopic or radiographic purposes. The typical fluoroscopic installation consists of an x-ray tube, a fluoroscopic screen and a transparent protective window. These elements are enclosed in a lead-lined cabinet with some means of placing the parts between the screen and x-ray tube. Fluoroscopic cabinets are made in several versions depending upon the requirements of the application for the following:

1. Sensitivity required (geometry, screen, x-ray equipment, etc.).
2. Manual or mechanical insertion of parts (belt conveyors, trays, specimen positioning devices).
3. Rejection devices (marking or physical rejection).
4. Record facilities (radiographic or photofluorographic).
5. Viewing (direct, mirror, biplane).
6. Entry point (for manual positioning of parts and film entry).
7. Special specimen handling equipment.
8. Control of room light on screen (fluoroscopic hood, curtain, booth).
9. Protection of technician and adjacent personnel.
10. X-ray power supply enclosed in cabinet or outside.

Fluoroscopic and radiographic cabinets may be placed directly in the production line as shown in Fig. 3, or may be placed in other locations if they are used for sampling production or for experimental work.

Fluoroscopic and radiographic cabinets are self-contained units which require relatively little special installation work. The x-ray equipment used in these cabinets have the same utility and installation requirements as laboratory installations. In some cases radiographic cabinets employ air cylinders to open and close the entries. Therefore, a small compressed air supply is required.

Fluoroscopic installations do not require a darkroom unless the cabinet includes radiographic or photofluorographic facilities.

Table II. How voltage ratings more or less determine application of x-ray units

Voltage Rating	General Application
Up to 50 kvp	Radiography of plastics, textiles, leather, grain, wood, micro-radiography.
50-100 kvp	Radiography of light materials and alloys. Fluoroscopy of foodstuffs, plastic parts, assemblies, and small light alloy castings.
100-150 kvp	Radiography of heavy sections of light metals and alloys, light metals, thin section of ferrous and copper alloys, fluoroscopy of light metals.
150 kvp—250 kvcp	Radiography of up to 4 in. steel or its x-ray equivalent. Fluoroscopy not in common use at the higher end of this kv range.
1—23 mev radium, cobalt 60 & other radioactive isotopes	Radiography of very heavy ferrous and nonferrous alloys.

Equipment Installation

X-ray equipment companies provide service engineers to install or supervise installation of their equipment. The installation consists of assembly of the equipment and connection of the components to the incoming service voltage, inter-connecting wiring, water supply and drain supplied by the purchaser. The equipment operation is demonstrated to the customer's representative and operating instructions and typical technique charts are provided. Within the guarantee period, periodic visits are made by a manufacturer's representative to check equipment performance.

For optimum results, the power supply to the x-ray equipment must be limited to small line voltage variation and particular attention should be paid to the wiring of equipment and between components. If the fluctuations of an "average line" are allowed to reach the x-ray equipment, the resulting fluctuations in x-ray output will produce less than satisfactory radiographs or fluoroscopic images. A 5 per cent drop in voltage at the x-ray tube filament will reduce the tube anode current to 50 per cent. A 50 per cent drop in tube current will produce a 50 per cent decrease in photographic effect. The penetrating power of the x-ray beam varies by more than the third power of the voltage across the tube. Hence a 15 per cent drop in line voltage will produce a 50 per cent loss in film blackening. Important decisions are made by the radiographer on shadows which are hardly more than suggestions. Off density film will not permit this critical inspection.

X-ray tube filament voltages are controlled suitably by stabilizers in most x-ray equipments. With filament stabilization, satisfactory radiographs can be made where the sudden line voltage variations are held to no more than ± 2½ per cent. However, in extreme cases, motor generator sets may be required.

Slow drifts in line voltage of ± 10 per cent are readily accommodated by manual line voltage control, generally a part of modern x-ray controls.

No industry-wide standards have

been set as yet for interconnecting wiring. However, x-ray equipment manufacturers have issued recommendation on wire sizes, supply transformers rating, etc. The selection of wire sizes for wiring between the supply transformer and the line switch, line switch and x-ray control, x-ray control and high voltage transformers is critical, since an inadequate wire size will cause undesirable voltage drops which affect x-ray output. Table III shows the minimum power and interconnecting wiring requirements of 150 kv and 250 kvcp industrial x-ray equipments.

Approximately 99 per cent of the x-ray tube current is converted into heat at the anode of the x-ray tube. If this heat is not removed the tube will be destroyed. Besides normal radiation and convection, the heat can be removed in four ways: (1) circulation of air by a blower on the tubehead; (2) circulation of insulating oil in the tubehead; the oil is cooled through a water or air cooled heat exchanger; (3) circulation of water through coils in the tubehead; (4) circulation of insulating gas inside of the tubehead over water cooler coils (used in some self-contained units).

X-ray tubes up to 150 kv are generally water cooled requiring an approximate flow of two quarts per minute at a minimum of 35 psi. Depending upon the ambient temperature, water cooled heat exchangers for forced oil cooling may require 13 to 15 quarts per minute water flow.

Mobile units generally employ an air-cooled oil cooler or air-cooled water cooler.

Clean Atmosphere Important

In many applications, heat is transferred from an x-ray tube anode to the cooling oil and from the cooling oil to the heat exchanger mechanism which may be either water or air cooled. The temperature of the oil should be kept under 125 F to prevent it from deteriorating and forming a deposit on the tube anode. The tube may fail if the deposit reaches a point where suitable heat transfer cannot be made. Therefore, the temperatures of the water or air cooling the oil should be carefully watched so that they do not exceed limits specified by the x-ray equipment manufacturer for continuous ratings.

Since the efficient radiographic and fluoroscopic procedures are connected closely to atmospheric conditions, it is desirable that some precautions should be observed. A dirty atmosphere may in time foul the mechanical parts, clog up the air-cooled oil-cooler heat exchanger and allow dirt to be carried into the darkroom on film holders.

Table III. Minimum power and interconnecting wire requirements of units

	150 kv—6 ma	250 kvcp—10 ma
Line voltage 50/60 cycle (single phase)	200-240 vac	200-250 vac
Minimum service transformer	5 kva	7.5 kva
Transformer line switch	2 No. 8 wires	2 No. 6 wires
Ground to line switch	1 No. 8 wire	1 No. 8 wire
Line switch	30 amp	60 amp
Fuse size	25 amp	60 amp
Line switch to control	2 No. 10 wires	2 No. 6 wires
Ground to control	1 No. 10 wire	1 No. 8 wire
Control to transformer	3 No. 10, 5 No. 14	3 No. 8, 5 No. 14
Control to oil cooler	———	1 No. 12, 5 No. 14

Therefore if possible, the laboratory should have a ceiling, tight doors and be placed under a positive air pressure.

A damp atmosphere will have the same effect on x-ray equipment as on other production tools with the additional possibility of increasing maintenance difficulties through the contamination of the high voltage portions, which may be exposed during repairs or maintenance inspection.

Extremes in ambient temperatures should be avoided to preserve operator's comfort and to insure proper equipment operation. It should be noted that air-cooled oil coolers add up to 2.5 kv in heat to the x-ray room. In a busy laboratory, this increase in heat may be serious over a period of time.

Cold ambient temperatures produce fewer problems. If water is used as a coolant, it is obvious that freezing temperatures contraindicate the use of this coolant. In some cases, the water may be circulated through a closed system and therefore anti-freeze may be added. The viscosity of high grade insulating oils used for cooling is not seriously affected by cold temperature down to approximately zero degrees.

However, over a period of time, water may be absorbed from the air in the oil and freeze out at lower temperatures forming an electrical path leading to equipment breakdowns. It is advisable, therefore, to have the x-ray equipment supplier install water absorbent filters and dessicant breathers on the cooling system. The coolers should also be temperature controlled to insure that the oil temperature can reach the preferred operating temperature of 85 to 95 F.

The area set aside for film, reading, film filing and office space should be immediately adjacent to the output end of the darkroom. To interpret the finished radiograph accurately, the inspector must make the examination under optimum conditions for visualizing detail as well as under minimum fatigue conditions. The viewing area should be large enough to handle the output of the darkroom. Depending upon the complexity of detail in the the radiograph, a good inspector can handle film at a rate of 0.1 to 5 per min. The inspector should be seated comfortably in a partitioned off area having subdued illumination. The dis-

(Continued on page 204)

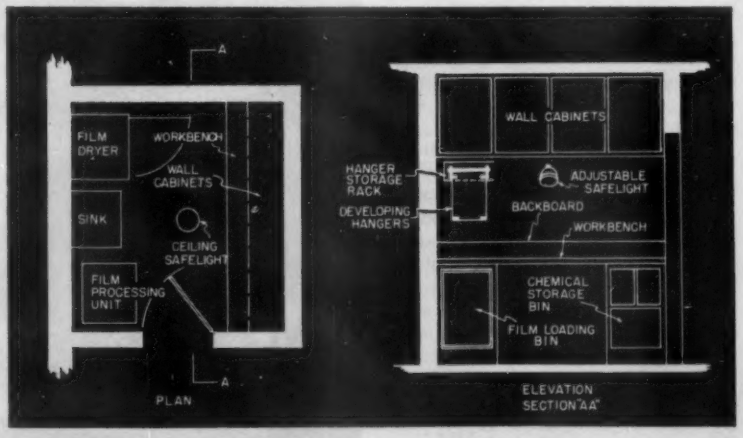
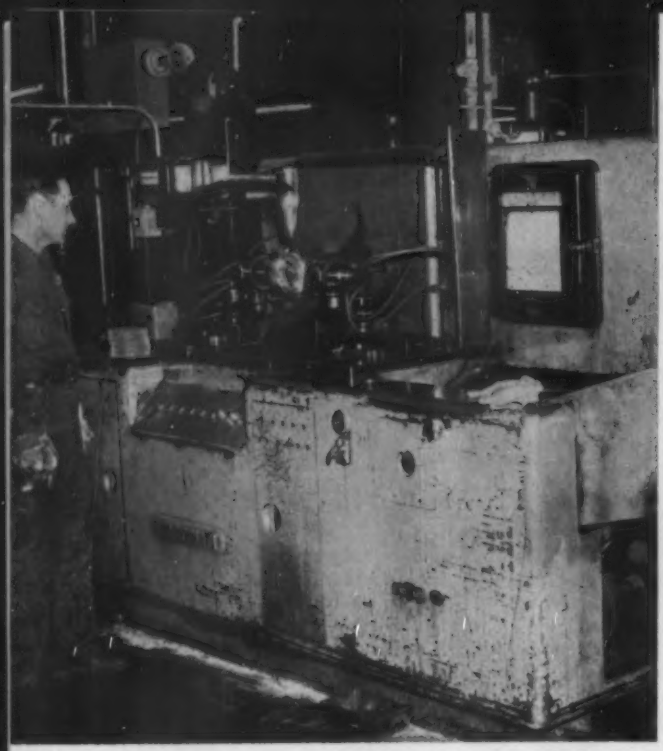


Fig. 4. This is a simple layout for a darkroom which is expected to produce up to twelve films per hour after first hour. It should be as small as possible



Propane Storage for Flame-Hardening

Expanding production sparked a chain of events leading to the present method of supplying gas to machines . . . Combination of this system and gas selection results in labor, material savings

By P. F. MILLER, Plant Eng., Morse Chain Co., Div. Borg-Warner Corp., Detroit, Mich.

Fig. 1. Machine operator is seen before one of the pieces of equipment in which propane is used for heating sprocket teeth

OUR FIRST experience with cylinder gases in large quantities came when we installed a flame-hardening machine early in 1948, to flame-harden the teeth on cast iron sprockets. Acetylene was believed to be the only gas with sufficient heat to flame-harden our sprockets; hence, our first installation of gases involved acetylene and oxygen.

The gas cylinders were mounted on individual trucks for ease of handling. Acetylene was manifolded in banks of six cylinders, Fig. 2, and the oxygen in banks of eight cylinders. The manifolded lines were, in turn, connected to the machine control panel by means of rubber tubing. We soon discovered this system was inadequate for our production because the consumption of the gases necessitated changing cylinders one and two times daily, during which time the machine was shut down.

We next installed an oxygen manifold system in an adjoining building, where space was available and ran a welded pipeline to the machine control panel. This system contained sixteen standard oxygen cylinders, eight on the line and the balance in reserve.

Our next problem was to find a location for installing an acetylene manifold system with sufficient cylinders to cut down the frequent cylinder changes and an automatic change-over system to eliminate down time on the machine. Above all, this had to be acceptable to fire regulations for explosive gases as set up by Factory Mutual Insurance Companies. We found that the type of room necessary could not be provided without great expense in building alterations.

At this time, we were approached on the possibility of using a patented chemically treated type of liquefied gas which would give us high flame temperature and many more hardened sprockets per cylinder of gas.

After a trial, we put this gas to use as recommended; two 100-lb cylinders of the liquefied gas were mounted on the portable wagons formerly used for the six cylinders of acetylene. This was all that was permitted inside the plant at one time. The results of flame-hardening were the same as with acetylene, including the same cycle.

Since the liquefied gas cost us $17.50 per 100-lb cylinder and we were ad-

Fig. 2. This is the way that acetylene supplies for flame hardening were carried

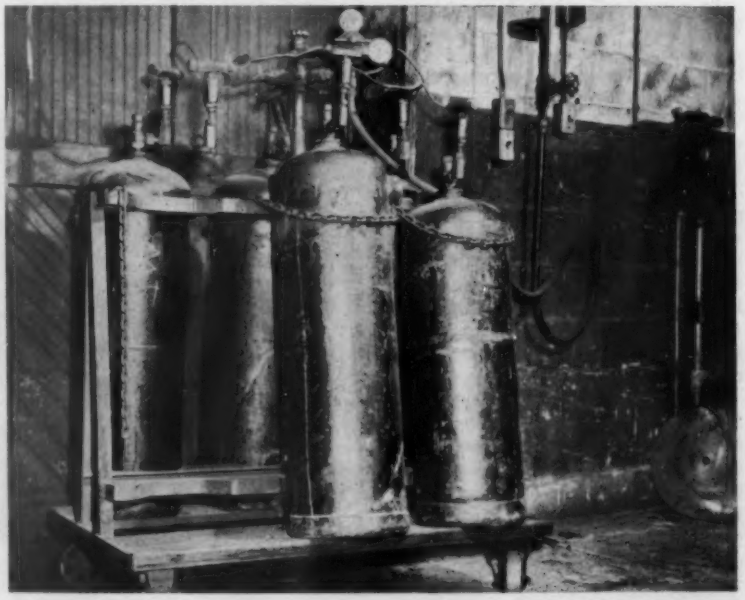


Fig. 3. These three rows of lockers hold 108 propane cylinders; gas supply changeovers are made by the gas supplier

vised that our oxygen consumption would go up, we kept a very close record of gas and oxygen used to compare costs against the acetylene and oxygen we were attempting to replace.

After several weeks of study, we found our gas cost decreased 36 per cent and our oxygen cost increased 76 per cent; oxygen was very cheap as compared to the gas. Our net result using the liquid gas was 10 per cent savings as compared with the acetylene and oxygen mixture.

After this test, our attention was called to the possible use of propane for our flame-hardening work. With propane selling for less than half the price of the gas that we studied, we proceeded to give it a try. The results were identical to the gas previously tested, including the time cycle and pressures used except that the oxygen pressure was reduced. The pressure for both gas and oxygen will, of course, vary with the number and sizes of orifices used in the burners.

Again we made an extensive study of the propane and oxygen for use for cost comparison and we found that the net result was a 53 per cent saving over the acetylene and oxygen mixture and a 48 per cent net saving over the patented liquefied gas and oxygen mixture.

Soon after changing our fuel to propane, we installed a Stearns-Rogers flame-hardening machine to harden tank sprockets and were also anticipating the installation of another Cincinnati Flamatic. This changed the picture entirely from the standpoint of propane consumption, since it was not permissible to locate propane tanks all over the plant to operate these machines. The only answer was to install a central system outside the plant building with a pipeline to supply the machines. Before the installation could be made, careful calculation of gas consumption for all machines had to be made, figuring all machines in operation at the same time. The requirements were calculated to be about 700 cu ft per hour. Consequently, we proceeded to engineer a central propane gas supply system that had sufficient capacity to take care of this volume.

Fig. 4. A typical locker installation

Our first thought was to install a medium size bulk tank, but we were unable to find a suitable location around our plant for such a tank that would be acceptable to the fire insurance company and meet with the local fire regulations. The only alternative was to engineer a system using 100-lb cylinders manifolded together. Since the system was to be located outside, we considered this in our calculations and made an allowance for sufficient gas flow in winter, at which time the liberation of gas is low.

We found it would be necessary to manifold fifty-four 100-lb cylinders together to supply the flow of gas necessary and to make the system automatic would require an additional fifty-four 100-lb cylinder manifolded together as a reserve supply, Fig. 3.

The first step in installing this system was to put down a concrete pad to set the cylinders on. Since the system was going to be visible from the street, we purchased locker type steel cabinets, each holding two propane cylinders, Fig. 4. These were set in three double rows, making a neat appearing installation.

An automatic change-over system was worked out that would open the reserve bank of cylinders as soon as the cylinders on the line were

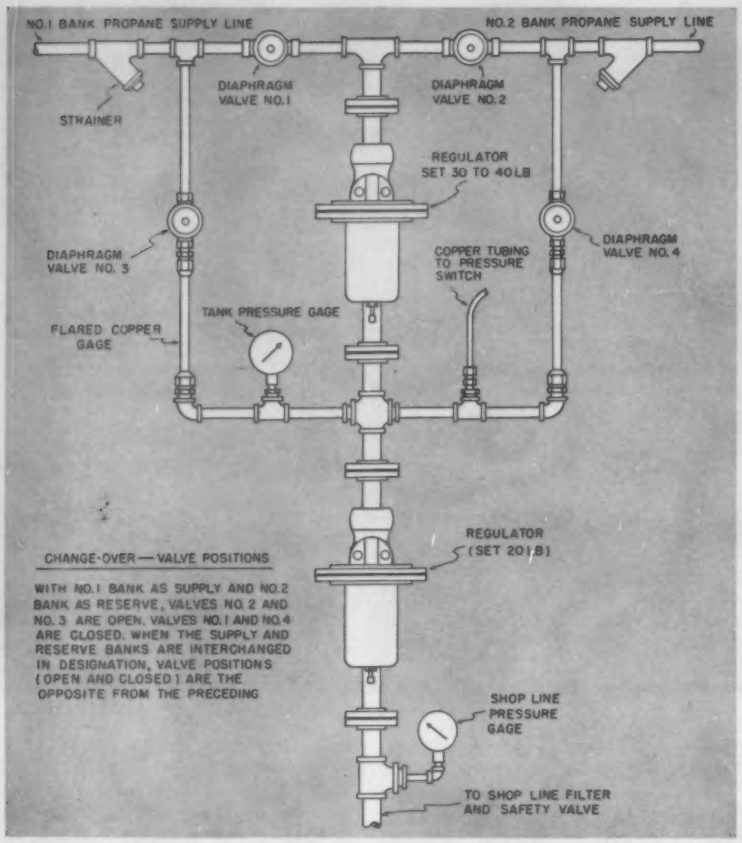

NO.1 BANK PROPANE SUPPLY LINE
NO.2 BANK PROPANE SUPPLY LINE
STRAINER
DIAPHRAGM VALVE NO.1
DIAPHRAGM VALVE NO.2
REGULATOR SET 30 TO 40 LB
DIAPHRAGM VALVE NO. 3
COPPER TUBING TO PRESSURE SWITCH
DIAPHRAGM VALVE NO. 4
TANK PRESSURE GAGE
FLARED COPPER GAGE
REGULATOR (SET 20 LB)
CHANGE-OVER — VALVE POSITIONS
WITH NO.1 BANK AS SUPPLY AND NO.2 BANK AS RESERVE, VALVES NO. 2 AND NO. 3 ARE OPEN. VALVES NO.1 AND NO.4 ARE CLOSED. WHEN THE SUPPLY AND RESERVE BANKS ARE INTERCHANGED IN DESIGNATION, VALVE POSITIONS (OPEN AND CLOSED) ARE THE OPPOSITE FROM THE PRECEDING
SHOP LINE PRESSURE GAGE
TO SHOP LINE FILTER AND SAFETY VALVE

Fig. 5. Layout shows regulator arrangement for flow from service and reserve tanks

exhausted—thus not interrupting production. This change-over is accomplished by using two pressure regulators connected in tandem and a by-pass line connected between the two regulators, Fig. 5. One regulator is connected directly to the shop supply line and is set to deliver 20 lb of pressure to the shop line. The second has a delivery pressure between 30 and 40 lb.

The propane cylinders in operation are connected to the by-pass line, thus feeding into the regulator set at 20 psi.

The reserve bank of cylinders feeds into the regulator set at 30 to 40 psi; thus, when the pressure in the cylinders in operation drops below the 30 to 40 psi pressure setting, the reserve system will supply gas to the regulator set for 20 lb delivery and on into the shop lines, Fig. 6.

An electrical pressure switch is connected to the by-pass line and is set to close a signal circuit when the reserve bank of cylinders goes into operation. This helps to give us sufficient time to replenish the supply of propane.

Eliminate Cylinder Handling

The system is serviced by our propane supplier and the change-over valves are reset by them when the full cylinders are connected. This has relieved us of practically all worries as to a constant supply of propane gas for our flame-hardening machines and has eliminated handling of propane cylinders by us.

Another step in eliminating cylinder handling was to replace the oxygen system of manifolded cylinders. Since we had installed a flame-cutting machine, our oxygen consumption had gone up to a point where we could have oxygen brought into the plant by trailers and connected to a central supply system which also operates on an automatic changeover method, Fig. 7. This equipment was furnished and installed by the company supplying us with oxygen.

Fig. 6. Filter is seen at the right of locker-to-plant piping

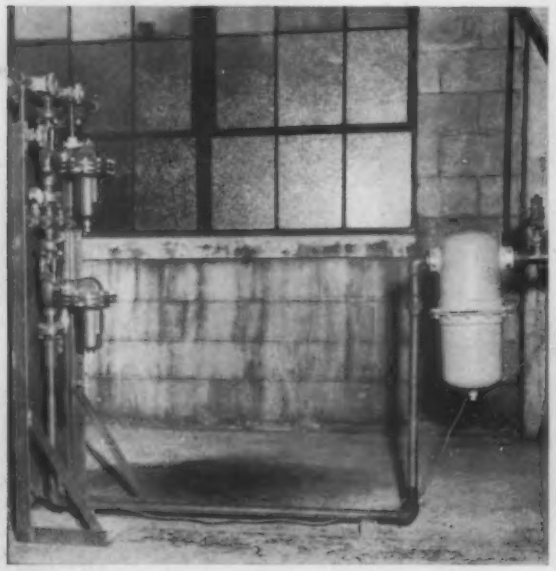
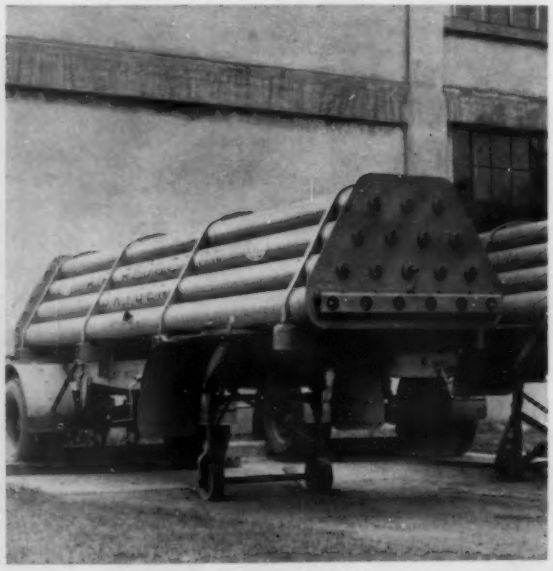


Fig. 7. Oxygen supplies are brought to plant in bulk trailers



Two Safety Devices

Offer Added Protection to Press Operators

INCREASED SAFETY for operators of large metal stamping presses is provided by a new protector air valve. The manufacturer states that this new valve combines an operating unit with a stand-by safety unit which functions to stop the press only if the operating unit fails.

In this new valve, only the operating unit moves with each stroke of the press. The safety unit stands by, ready to function only if the operating unit fails. In this event, the safety unit immediately acts to cut off air pressure to the clutch and brake.

This feature means that the safety unit is not subjected to the wear of regular operation and does not continually duplicate the cycle of the operating unit. Thus, the possibility of simultaneous failure is virtually eliminated.

A second major feature of the new valve is that when the safety unit does operate, it locks in its operated position and cannot be reset until the fault which caused the action is corrected. No special device is required for reset.

This valve is completely stable. The safety unit is not subject to operation due to transient or minor conditions. However, a pressure leakage approaching that necessary to keep the clutch engaged will positively and quickly cause the safety unit to function.

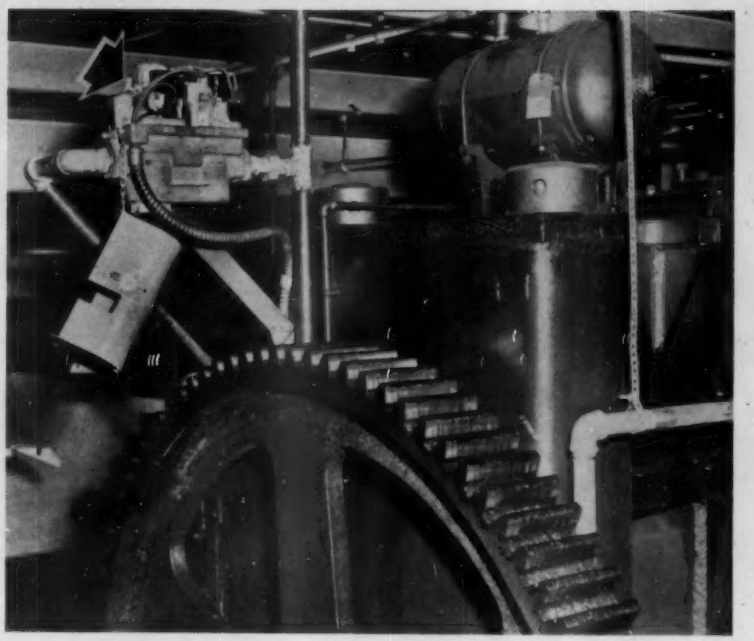
This protective device is a 1¼in. pilot-operated valve designed to operate at any pressure between 25 and 100 psi. It is normally furnished with 110 v electromagnets. It can also be supplied with coils for other supply voltages.

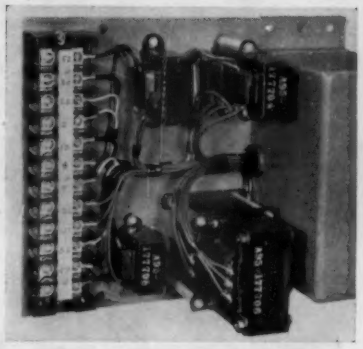
Although the valve's primary design features have to do with safety, simplified maintenance has also been provided for, since the valve can be completely serviced without disturbing the piping.

Anti-Repeat Control

Another safety device being manufactured by this company is a new anti-repeat control for presses, incorporating transistors instead of moving parts. These new controls are intended for use on all presses which have clutches or brakes, or a combination of the two, operated by air pressure, including the huge presses which turn out large automotive body parts.

These anti-repeat controls are designed to prevent accidental repeat operation of the press when the operators' hands are not depressing the pushbuttons. The manufacturer says the unit is as nearly "fail-safe" as possible, which means that failures in the control system—such as a power failure, a short circuit, or a stuck pushbutton — will act to stop the press rather than make it operate unexpectedly.





Above: Valve (arrow) has stand-by safety unit which operates to stop the press if operating unit fails to function. Right: Anti-repeat control has no relays, but employs transistors instead

With this anti-repeat control equipped with transistors instead of moving parts, the problem of maintenance is greatly reduced.

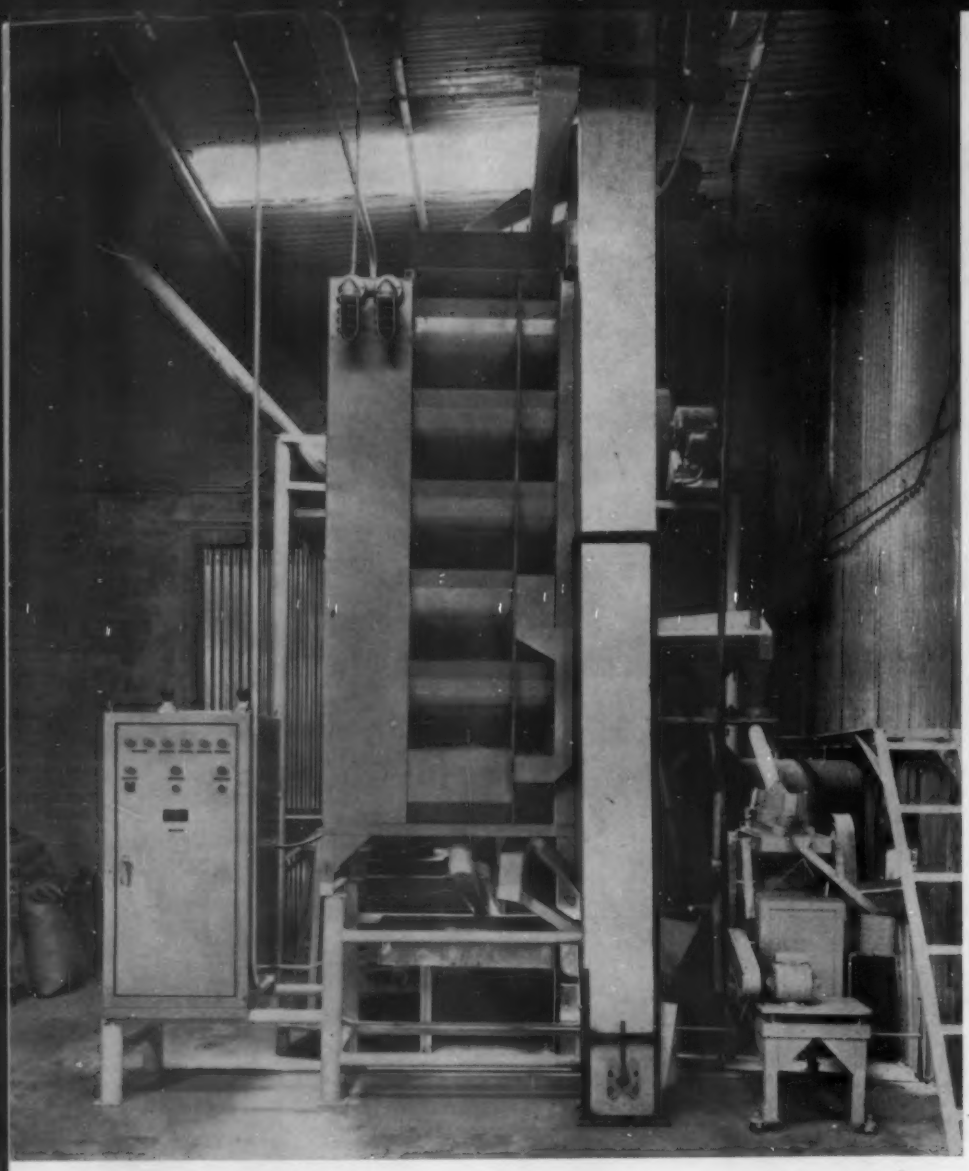
The basic principle of this unit is to make sure the operators' hands are not caught by the descending ram. The sure way to do this is to make it necessary for the operators' hands to be somewhere else while the ram is descending. Therefore, "run" buttons are provided at a suitable distance from the danger zone of the press, and circuits are arranged so that a down stroke cannot take place unless all "run" buttons are depressed.

Enough "run" buttons are provided so that each man working on a press must have both his hands occupied in this manner during the down stroke.

If this were all, however, it would be possible to negate the safety features by fastening or jamming the pushbuttons in the "run" position, allowing the press to continue to operate while workers' hands were free.

To make this impossible, the anti-repeat feature is incorporated in the circuit so that not only must the "run" buttons be depressed and held during most of the down stroke, but the control also requires that they be released sometime during the balance of the stroke, and depressed again before a new stroke can begin.

These two safety devices are manufactured by the Clark Controller Co., Cleveland, Ohio.



One of the Coronatron units installed at Ashley's, Inc., El Paso, Texas firm

Coronatron Electrostatic Separator—

For Non-Magnetic, Same-Size, Same-Weight Separation

ONE PROBLEM PLAGUING the food industries for years has been the separation of rodent contamination from grain of the same weight and same size. This same-weight, same-size separation problem exists in other industries too so it will be welcome news that the Mechanical Research Department of The Quaker Oats Company has done something about it.

Their answer to these problems that cannot be handled by standard air, mechanical or flotation separation equipment is the "Coronatron." This machine operates on the ability of different particles to take on different degrees of an electrostatic charge. For example, corn is introduced to the electrostatic field by gravity chute. As it flows through the field the contaminating elements are repelled to a greater degree than is the pure grain. Proper adjustment of the splitter setting isolates the separated elements.

It is pointed out that The Quaker Oats Company, in cooperation with the U. S. Bureau of Mines, has made an exhaustive study of spark energy in relation to grain dusts. This has resulted, it is reported, in a reduction in current output of the unit by means of resistance to a safe level of operation.

Want Additional Data?

If you do, just drop a line to the Editor, Plant Engineering, 110 S. Dearborn St., Chicago 3, Ill. Or, use one of the postage-paid cards elsewhere in this issue; just mention "Coronatron."

Timing Belt Drives—

Industrial Applications Illustrate Their Versatility

USE OF A timing belt can remove various limitations in drive design under so many circumstances that, while this type of power transmission has been available for some time, it is worth while to consider briefly some of its possible applications.

It is particularly suitable for drives where speed ratios are large and the distances between centers short, and for conditions where it is important to avoid slippage because of the need of accurate timing.

These belts are very flexible and have teeth of neoprene with a strong fabric jacket which engage with grooved pulleys to make a non-slip drive without initial belt tension. The belt itself consists of a layer of neoprene to which the teeth are vulcanized. Tensile strength and resistance to stretch are secured by molding the neoprene of the belt around a cabled steel wire in a single layer. This provision against stretching also maintains a practically constant pitch, even with small pulleys, and makes it possible to have fixed center drives.

For conversion jobs where the layout of machines is changed, or when it is desirable for some reason to change an existing drive, the great problem is often lack of space. It is frequently necessary for this reason to eliminate gear speed reductions which call for a small drive pulley and large driven pulley with a very short distance between centers.

The timing belt fits in very nicely for such conditions. As there is no need of a clutch or coupling its first cost is reduced. From the maintenance standpoint, it is also economical because lubrication is reduced to a minimum.

Because the lack of initial belt tension diminishes the bearing loads, timing belt drives can therefore be lighter and less expensive, and the power consumption is less. Quite high speed operation is permissible without lubrication of the power transmission element and the inertia mass is much less than in other forms of transmission which makes for facility in quick starting with minimum power and for easier stopping.

If the driven machine is subject to shock loads the small driving pulley may be grooved for the teeth of the timing belt and the large driven pulley may be flat faced to permit some slip when the shocks take place. But there will be no slippage on the small driving pulley where it is most likely to occur even under normal conditions. Such an arrangement in converting from flat belt drives is substantially less expensive as the existing driven pulley may be retained, provided it is not crowned.

It should, nevertheless, be borne in mind that with the above arrangement it is necessary to have initial belt tension and that water or oil on the drive is liable to cause slippage, which will not take place if both pulleys are grooved. Consequently, some of the basic advantages of the timing belt drive are lost and local conditions must be the deciding factor as to whether the sacrifice is justifiable.

Here are a few specific examples of how timing belt drives are employed in industrial applications. A textile winder drive, Fig. 1, consists of a 3 hp, 1140 rpm motor using a 4-in. diam drive pulley and a 9½-in. driven pulley. The belt is one inch wide.

An interesting point about this drive, showing the effect of local conditions, is that a driven pulley of extra width is used on the timing belt application. This was done to allow for play in the shaft of the old sleeve bearing motor which was not replaced.

In Fig. 2 a timing belt drive for a 400 cycle, 25 kw alternators operating at 1714 rpm is driven by a 40 hp, 1800 rpm motor. The driving pulley on the motor is 6.35 in. in diameter and that on the alternator slightly larger. This installation is at the Douglas Aircraft plant in Santa Monica, California.

This is one application for which the timing belt drive is particularly well suited because it insures the constant linear speed necessary to maintain the output of the alternator at a constant 400 cycles per minute, as required. Of course this could be accomplished by other means but the first cost and maintenance expense would be substantially higher.

Another application is a grinder equipped with a timing belt from the

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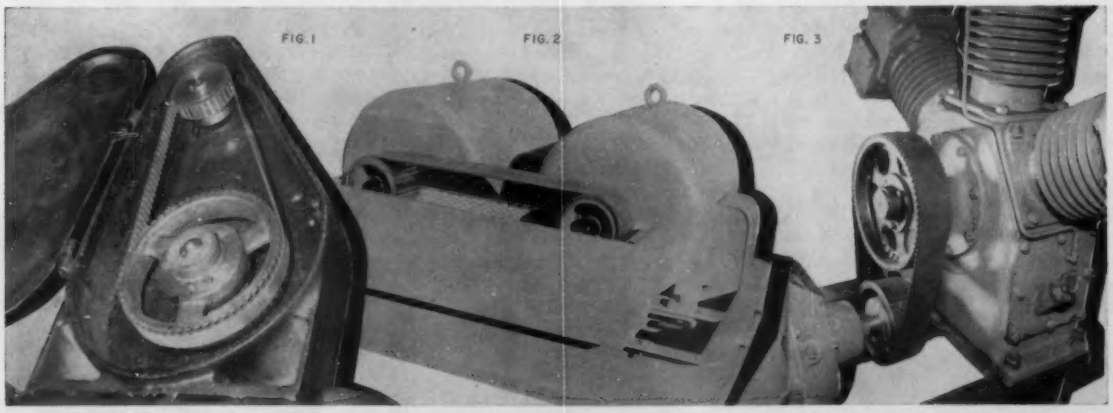


Figs. 1, 2 and 3. Illustrations show several applications of timing belt drives. In Fig. 1 it is used on a textile winder. In Fig. 2 it is used on an alternator and insures a constant linear speed for this operation. Transmission of power from a diesel engine to an air compressor by use of a timing belt drive, shown in Fig. 3 insures a constant linear speed

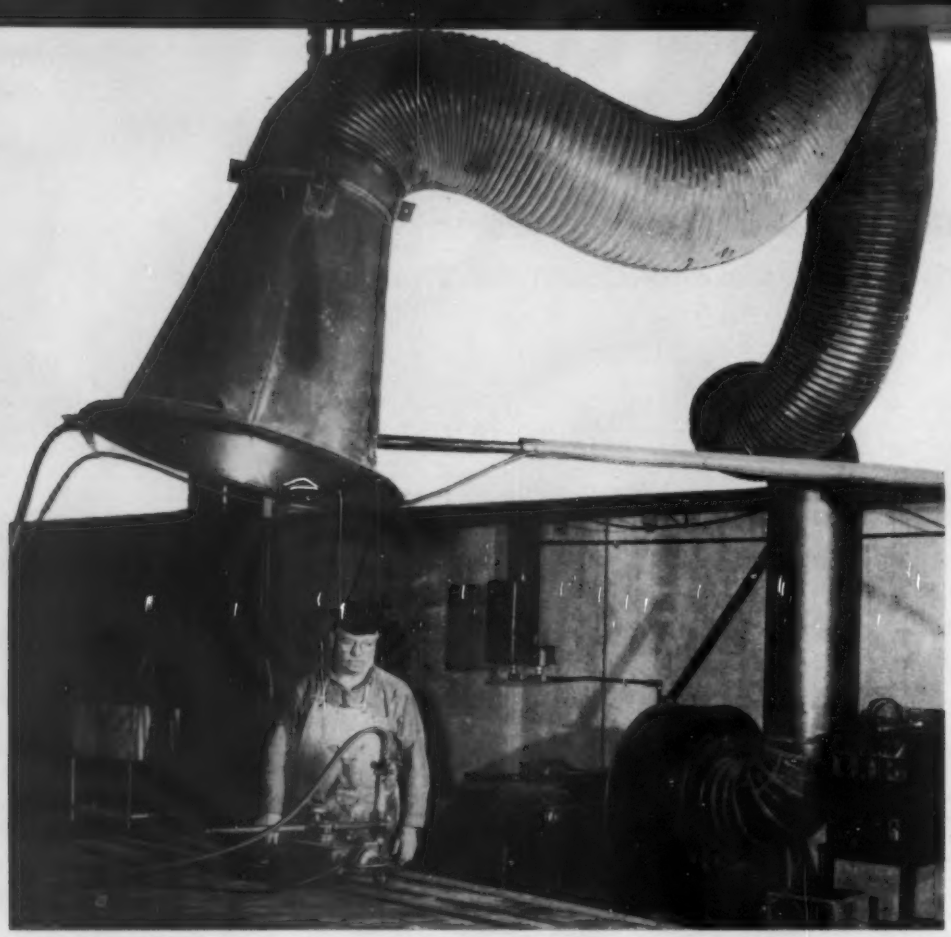


Fig. 1. Exhaust duct, looking like a tuba horn, is one of the pieces of equipment found in the shop

Wow! Look at Dow—

Its Boiler Shop Combines Spaciousness with Versatility

FOR ALL PRACTICAL purposes, location of the Dow Chemical Company's plant was determined by natural brine deposits from which bromine was originally processed by the firm. From its beginning in Midland, Michigan, the company has expanded its operation until today they involve many people and a great deal of equipment.

Because of its geographical position, the company has to operate—in this particular plant—in ways that might be considered unusual. It cannot, for example, conveniently farm out work to nearby shops. To help keep production going, the company has an extensive shop system. An important segment of this is the relatively new boiler shop which is equipped to handle an odd variety of jobs, from the making of simple pipe flanges to the construction of large tanks and vessels used in the chemical industry. There are over 200 people on the shop payroll. About 60 per cent of this number is employed in the shop proper; others work in the field.

The shop structure is L-shaped, extending over some 57,000 sq ft; lockers, lunch room, stores and office areas are not included in this figure. A large portion of the curtain wall area includes pre-cast panels employing an unusual combination of materials. Cellular Polystyrene plastic material is sandwiched between two layers of concrete, Fig. 3.

In the material handling phase of operations in the shop among other equipment there are cranes and jib boom hoists. Two of the five cab-operated bridge cranes have 30-ton main hoists and 5-ton auxiliaries. Light loads are handled by two 3-ton, floor-operated units. One of the specific jobs, for example, that the bridge crane is used for is to pull heavy plate through the brake roll, making the job of cylindrical forming easier.

Equipment to be built or repaired is carried to and from the shop on trucks and trailers; if the items are big and heavy, they are transported via the company railway system. Outgoing and incoming work is handled at one extremity of the L-shaped building, Fig. 5, near the superintendent's office, and raw material is received at the other end of the building leg, Fig. 2. Plates, bars and structural forms arrive by gondola cars and are removed by overhead cranes.

Stock is placed in racks and is kept in a fenced area, Fig. 2. It is inventoried by the stock room division which is responsible for ordering material according to the regular and special needs of the shop. Items of a variety of metallurgical designations are kept in stock including Monel, nickel, copper, brass, stainless steel, Inconel, magnesium and nickel-clad steel. Stock thicknesses range from 16-gage to 8 inches; structural forms such as channels and I-beams up to 18 inches are commonly kept on hand.

One of the pieces of shop equip-

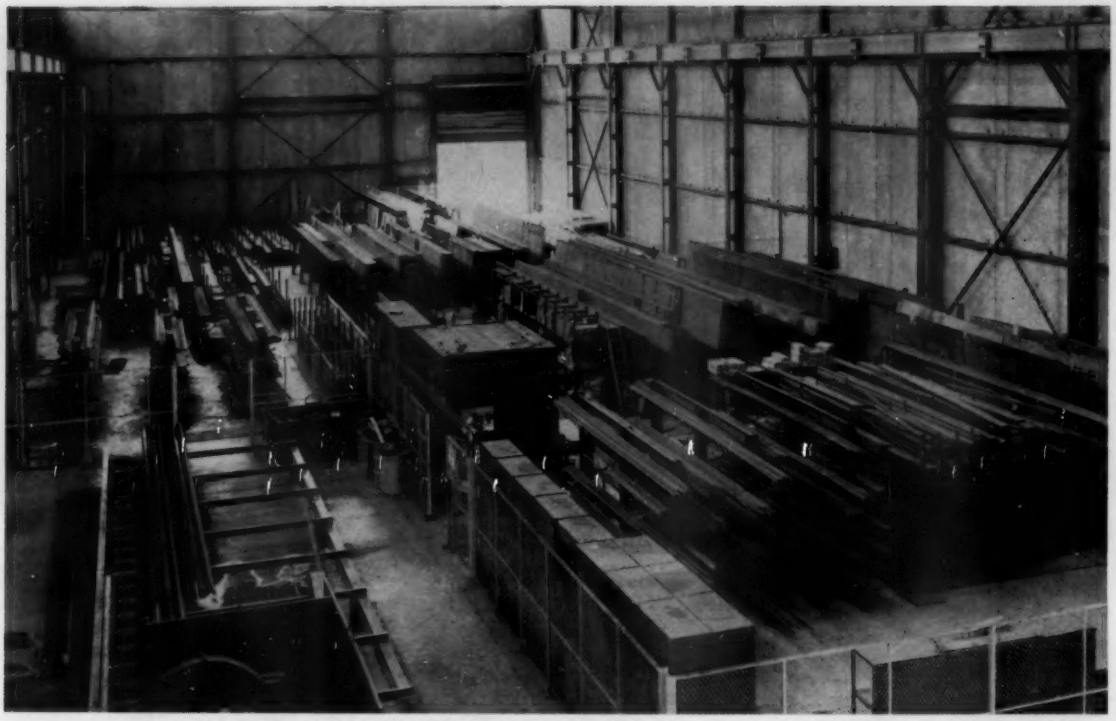


Fig. 2. Wire fence separates material storage area from rest of the shop; doorway in the back is for railroad cars

ment used to cut the raw material is a liquid-cooled friction saw, rotating at 1700 rpm, Fig. 13. This 36 in. diameter saw cuts pipe up to 6 in., structural forms and round bar stock up to 3 in. in diameter. Material is fed horizontally past the saw by means of a roller conveyor and cuts are made by advancing the saw hydraulically into the stock. For safety and performance reasons, the saw blade is closely inspected every working day.

The material layout department is conveniently located near the stock storage area. Steel plates are laid over workhorses and dimension details are transmitted on them. Layout journeymen and their helpers use various guides in their work. They may follow their own field notes based on personal job inspection, sketches, engineering drawings or actually copy the existing equipment.

Plate that has been laid out can be cut on one of several oxygen cutting machines, Fig. 1. Small sections can be processed on a bandsaw. Several squaring shears are available for straight cuts. One of these is designed to shear 12-ft long plates up to a thickness of ¾ in.

There are five brake rolls to take care of the cylindrical forming requirements on steel plate for such things as tanks, and distillation columns, Fig. 5. Plate sizes that can be bent range up to 14 ft in width

Fig. 3. Polystyrene sandwich panels are used in shop's curtain wall construction

Fig. 4. Angle iron bender in the shop

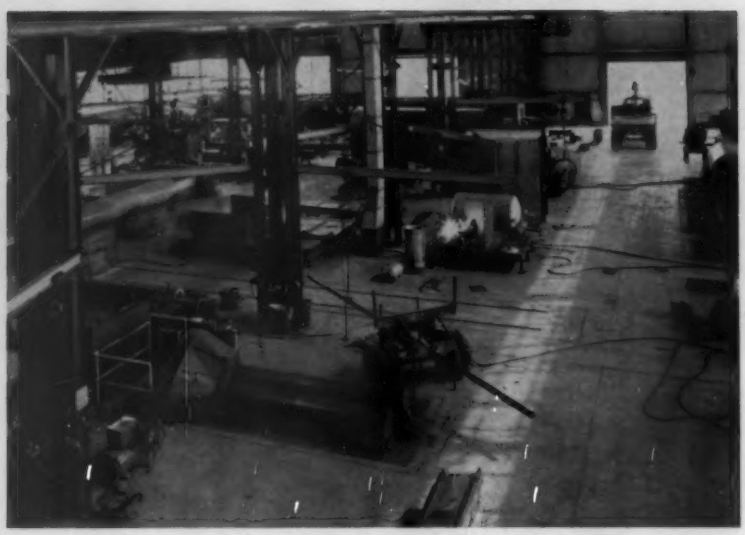


Fig. 5. Finished work leaves this end of the boiler shop by railroad car and truck

Fig. 6. Tubing leads to duct in floor

Fig. 7. In background, hydraulic press.

and a thickness of 1 in. Angular bending jobs are done on a large capacity apron brake and also a press brake. Angle iron is formed on a roll bender that has been designed to process metal of this cross section.

Dished ends for tanks of large diameter are furnished by outside suppliers; however, a certain amount of the small diameter ends are formed on a 400 ton capacity hydraulic press found in the shop, Fig. 7. A large gas heated oven is located near this unit to heat the metal blanks used for forming the dished ends.

During a year's time, the shop turns out a great deal of metal in the form of welding beads. Much of this is attributed to a giant boom welder, Fig. 9, that easily handles jobs that ordinarily might be considered rather awkward to work on. This machine, using the submerged-arc welding process, can run welds on tanks up to 60 ft in length and 12 ft in diameter. The operator rides with the welding unit alongside the boom. From his seated position, he observes the welding procedure and controls welding conditions. Shaft-driven rubber-tired rollers support and help turn a tank while the welding unit is depositing metal.

The village smithy may be gone from beneath the spreading chestnut tree but not from the Dow scene, Fig. 11. There are several blacksmiths in the shop and they have at their disposal modern forges requiring no hand-cranking for draft. In addition to the familiar anvils, there is a large steam

Fig. 8. In this area items such as flanges and flanged pipe stubs are machined

Fig. 9. The employee operates shielded-arc boom welder working on a large vessel

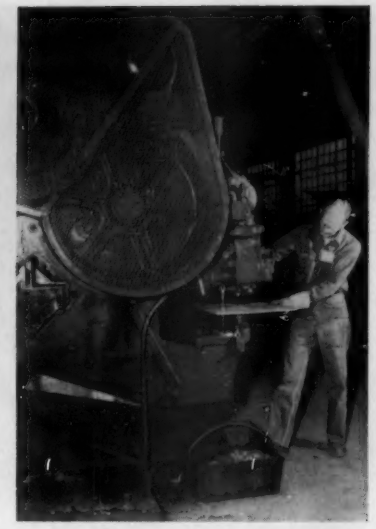


Fig. 10. This unit is highly versatile

hammer and a motor-drive helvehammer. In this department are made such things as chisels, hooks, brackets, straps and caulking tools.

Pipe flanges and flange pipe stubs which are made in the shop, are machined in the shop's machine tool area, Fig. 8. The units that are used to process the items mentioned include two vertical turret lathes, a radial drill and a drill press equipped with a multiple-spindle drill head.

For the removal of cutting and welding fumes, the shop has several ventilating systems. One of these is rather unusual in that the duct work is within the concrete floor of the shop. Six-inch pipe stubs protrude from the floor at various points. To make use of this system, an employee simply removes the cap from one of these stubs and attaches one end of a piece of flexible tubing to it and he is in business, Fig. 6. The exhaust fan for this ventilating system is located in a platform attached to one of the building columns. This is accessible by means of a steel ladder.

The other ventilation set-up is in the vicinity of one of the oxygen cutting machines, Fig. 1. It employs a large truncated cone attached to a section of flexible tubing which is about 12 in. in diameter. For changing the position of the large flexible duct over the cutting table, the duct is supported by monorail units at two poins. The exhaust inlet height is varied by means of a hoist which is attached to one of these units.

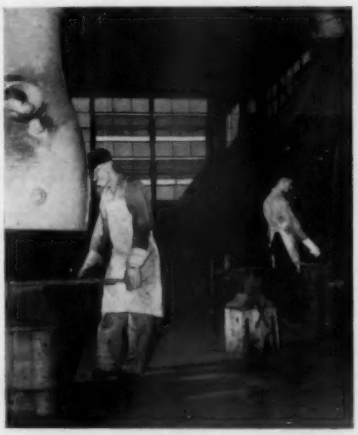
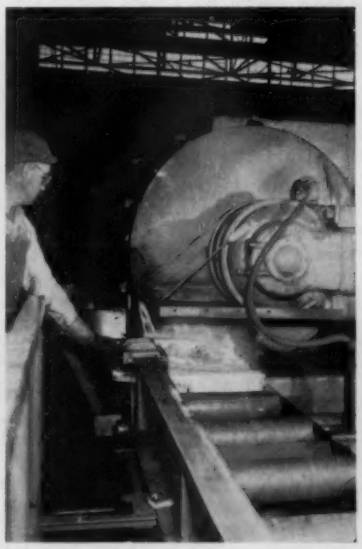


Fig. 11. At left, 'smith steam-hammer

Fig. 12. Boiler shop has worked over one million man-hr without lost time injury

Fig. 13. Friction saw cuts shop metal



Members and guests attending the Eighth Annual Conference of the Incorporated Plant Engineers took time out between dances to pose for this picture. The three-day Conference was held at St. Annes-on-Sea, Lancashire, England

Report on I. Plant E. Conference

And Visit to Industrial Plants in Britain

By R. L. MARINELLO, Managing Editor

MEMBERS of the Incorporated Plant Engineers held their Eighth Annual Conference at the Majestic Hotel, St. Annes-on-the-Sea, Lancashire, England. Plant engineers from the many branches in Britain were in attendance along with several overseas members. Another overseas member besides myself was Mr. T. J. Hayes. He is Inspector of Works (Mech.) with the Public Works Department, Kumasi, Gold Coast, Africa.

The first day of the conference began when Mr. R. H. Cobbold, the retiring President of the Institution, installed Mr. G. Sievewright, as the ninth President of the Institution.

In his speech, Mr. Sievewright said that the Institution had grown from modest beginnings in 1946 to a membership of over 3,000, and its activities were becoming widely known and appreciated. He mentioned that the role of the plant engineer had undergone a change in recent years and today he could claim a key position not only in industry but also in commerce and agriculture.

He also stressed the need for members of the Institution to help and encourage the younger members of the plant engineering profession to take courses in plant engineering, in order to better fit themselves for the increasing complexity of modern industry.

Following Mr. Sievewright's speech, Mr. E. E. Butten presented the first paper "Plant, People and Prosperity." With the prospect of automation taking over many operations in tomorrow's plant, he remarked that the plant engineer today who prides himself on being able to take off his coat and do any job necessary in the plant, may find that his future function will be that of controlling a team of specialists.

With this thought, he posed the question: "Will plant engineers of the future tend to be organizers rather than technicians, and if so what are the functions and tools of management in which they will have to be expert?"

Know Management Functions

In the discussion which followed, emphasis was placed on the need for plant engineers to have a good knowledge of management functions, and the need to introduce a study of management subjects, and also the humanities, into university engineering courses.

In the afternoon, four Discussion Groups were held. Discussion Group No. 1 was on the subject "Electrical Safety in Plants." Chairman of this group was R. H. Cobbold, of W. D. & H. O. Wills Tobacco Co. The speaker was H. W. Swann, formerly Her Majesty's Senior Electrical Inspector of Factories.

"Can Work Study and Its Incentives be Applied to Maintenance?" was the subject for Discussion Group No. 2. Chairman of this group was R. A. Rogers, plant engineer of Hoover Ltd. The speaker was A. J. Speakman, Technical Officer and Head of the Work Study Unit, British Productivity Council.

Discussion Group No. 3 sought answers to the question: "Is There a Future for Tracked Earthmoving Equipment in View of the Development in Rubber-Tired Earthmoving Equipment?" Chairman of this group was C. H. S. Howkins. The discussion team consisted of members of the London Branch of the Incorporated Plant Engineers. They were: G. F. Gray, K. F. Dormer, H. Purse and H. E. Roberts.

Subject for Discussion Group No. 4 was "The Impact on the Plant Engineer of New Engineering Materials." Chairman of this group was L. C. J. Bayley, with members of the Birmingham Branch serving on the panel. They were: J. Lang, E. A. Lee, K. J. Luntley and M. C. Rogers.

In the evening a reception by the President and Mrs. Sievewright was

followed by the Conference Dinner and Dance.

At the next morning's session the chairmen gave brief summations of the four discussion groups held the previous afternoon.

Mr. Swann mentioned that his group discussed the legal responsibilities of plant engineers in respect to electrical safety, and dealt briefly with the causes and prevention of electric shock and fires. He then referred particularly to the need for training plant engineers in the field of electronics.

Mr. Speakman in summing up the findings of his group felt that the general consensus was that nobody would say that work study cannot be applied to maintenance. Based on their own experiences, he thought the men tended to magnify or minimize the difficulties.

Mr. Howkins said that after much discussion the group unanimously agreed that there is a future for tracked earthmoving equipment.

Mr. Bayley made the interesting comment that it became obvious from the discussion that new materials were not necessarily new to every one. One of the lessons learned was that the dissemination of information on the applications of materials is one to which members can give a lot of thought and develop considerably.

The Conference was then brought to a conclusion by the President, Mr. Sievewright, who spoke of the importance of Mr. Butten's address and the value of the Discussion Group proceedings.

The first visit was at the Perivale, Middlesex, plant of Hoover Ltd., where R. A. Rogers, the plant engineer, gave me the $10 tour of the plant. In addition to manufacturing vacuum cleaners, the company also makes sweepers, polishers, washing machines and steam irons. All these items, however, are not manufactured at the Perivale plant. In all, the company has nine plants located throughout Great Britain.

It was surprising to find the absence of a railroad siding at this and several other plants visited. They find it more convenient to use trucks to bring necessary materials to the plant and to transport the finished product.

Plants Visited

Another visit was at the Preston Works of the English Electric Co. where a variety of components are machined for the Canberra aircraft and diesel-electric locomotives.

An interesting sight was the assembly of the fore part of the fuselage of the Canberras, each with its intricate network of hydraulic and electrical controls. While walking through the diesel-electric locomotive section, I noticed a number of diesels stenciled for such destinations as New Zealand, Rhodesia, Queensland, and Teheran.

During my stay in Wales, Mr. Calder, a representative of Spira-Sarco Ltd., escorted me to the Margam Works of the Steel Company of Wales. The architecture of this works is rather interesting. The framework was welded throughout, making the works the largest welded structure in the country. It has a weight-saving of 15 per cent over an equivalent riveted structure.

Mr. G. M. Calder was my guide during our tour of the colliery and steel plant

In securing the machinery to the concrete floor, all the foundation bolts were set body-first with a permitted tolerance of only 1/16 in. Every one of the 30,000 bolts had to be individually surveyed in by a surveyor.

The next day, Mr. Calder and I were supplied with coveralls and boots, along with helmet and lamp, for our tour of the coal mines at the Llanharan Colliery. A number of conveyors are used to carry the coal from the face the men are working that day to where the cars are loaded which is some distance away. We came away with a lot more respect for a miner's job.

Other plants visited during my stay in Britain included an electric range plant in Enfield, Middlesex, a tobacco plant in Bristol, a tannery in Yeovil, a dairy plant in Melksham, and an airplane plant in Filton.

Impressions of Britain

As the plane was coming in for a landing at the London Airport the first sight you see is the red tile roofs of the buildings. Where you might get a mixture of colors back home, the red predominates in Britain...

Britishers are at home in their gardens and there are very few people who do not set aside a little spot of ground for growing something. A great deal of care is required for growing fruits and vegetables because of the chilling frosts they get. In several gardens I noticed the tomatoes were grown in hothouses . . .

Road courtesy is something you see practiced every hour of the day. The majority of roads are two-lane, twisting and turning throughout the countryside. It would be difficult to keep traffic moving at a steady pace if it were not for this cooperation . . .

This is just one of a number of industrial plants visited. View of the Steel Company of Wales shows a section of the casting bay with teeming in progress

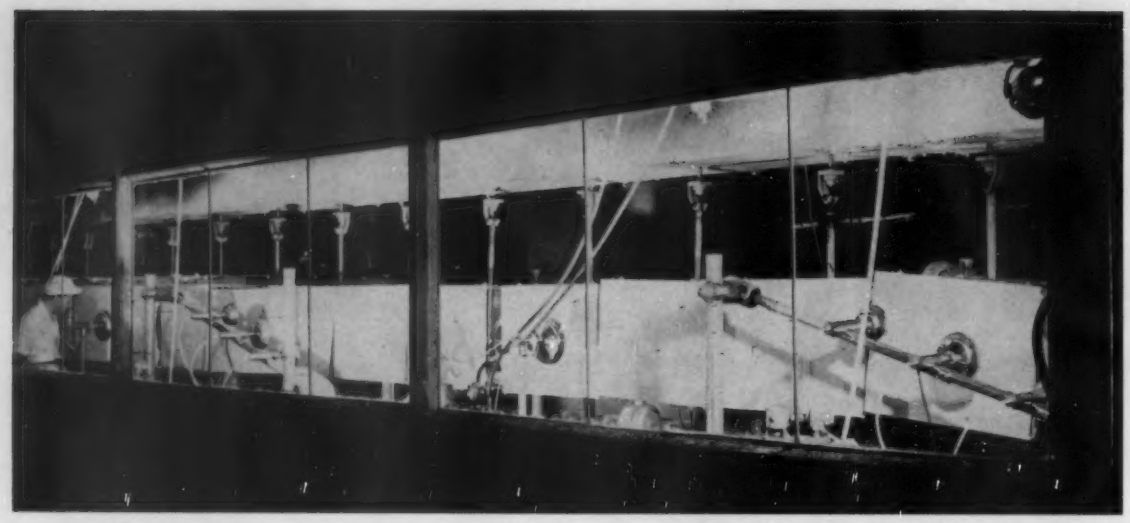


Fig. 1. View into electrostatic paint spray booth highlights absence of paint overspray by clarity of the windows

Electrostatic Spray Painting

Stretches Paint Mileage 84 Per Cent On Washers

By THOMAS J. SNODGRASS, Superintendent-Finishes, General Electric Company, Appliance Park

MECHANIZATION and improved processing in the production of General Electric automatic washers and dryers in the modern GE plant at Appliance Park, Louisville, Kentucky, are accounting for increased production — with higher quality — at lower cost. This is especially true in the finishing of the Home Laundry units which are finished electrostatically instead of by the hand-spray method formerly employed at the Trenton, N. J. plant, from which the automatic washer and dryer production lines were moved.

Paint mileage is increased 84 per cent in finishing washers. In Trenton, we were producing 9.74 good automatic washers per mixed gallon of finish. Now, at Appliance Park, with the electrostatic spray painting, we are able to get 17.97 automatic washers with one gallon of finish.

And, where formerly we were able to get 5.49 dryers per mixed gallon of finish with hand spray at Trenton, we are now able to get 9.56 good units per mixed gallon of finish—an increase of over 74 per cent. Quality of the work is decidedly improved.

Painted parts for the washers and dryers are classified broadly as "white" and "black." Painted on separate lines, the white and black lines are combined going to assembly. Black parts are flow-coated.

Material for the conveyor line handling the white parts comes over to finishing from fabrication on two supply conveyors. On the automatic washer, the cabinet is painted white. The six white parts of the dryer include two sides, a front, top and two components, the inner and outer door, which are combined to form the dryer door.

Parts to be painted are loaded on the monorail conveyor. Four hours and 10 minutes elapse from the time parts are loaded on the finishing line until they are unloaded in assembly. The continuous, straight-through conveyor eliminates building of banks and—in cutting down extra handling—lessens the possibility of damaging parts.

First entering the Bonderizing machines, the work to be painted on the white line goes through seven cleaning stages: cleaner; rinse stage; rinse; phosphatizing; rinse; chromic rinse, and deionized water wash.

After a five minute dry off in a steam heated tunnel at 300 F, the work makes a 30 minute cooling cycle; then goes to the flow-coater for prime.

Two position racks are used for most of the parts to accommodate flow-coating and electrostatic applications.

Sides and bottoms of the cabinets are sprayed with nozzles in the flow-coater. The work then goes through a drip tunnel. Thirty minutes after baking, the work goes to the prime sand area where prime defects are sanded out. The work is repositioned automatically from 48 in. to 36 in. centers for paint application in the electrostatic booth. Inner and outer doors are grouped at 40 in. centers. Before entering the finish paint area, dust is blown off and outside surfaces get the "tack rag" treatment. Two hand sprayers in water-wash booth reinforce the coating on some irregular shaped sections and bracings just before work enters the electrostatic spray booth.

In the 44-ft long electrostatic spray area, two Ransburg No. 2 Process triple heads are used on either side of the conveyor line, and two triple heads at a lower level coat the underneath surfaces of the cabinets. No compressed air is used in these units, which are products of the Ransburg Electro Coating Corp. Atomization occurs under the influence of the electrostatic field, producing a spray pattern of electrically charged particles. The attraction of the field pulls the spray to the moving parts which are grounded electrically on the conveyor. All of the spray is deposited.

One and one-third mil finish is applied in a double pass, with a one minute flash-off between. Too, there is a five minute flash-off before the pieces travel into the electric oven for baking at 320 F for 36 minutes. After baking, the finished parts travel to the finish inspection station.

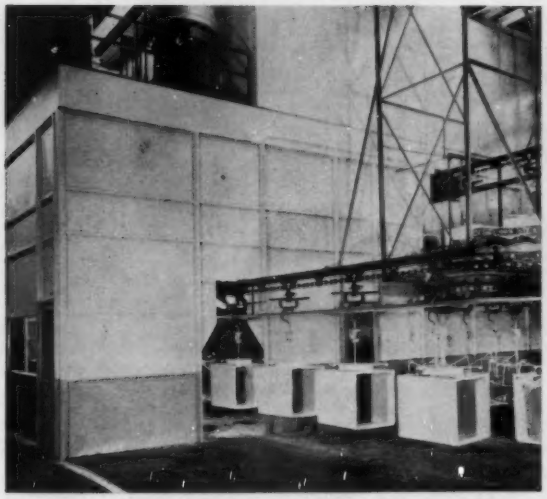


Fig. 2. Entrance of finish spray booth. Work enters on lower conveyor and exits from drying oven at upper right

Fig. 3. Flow-coat application of prime coat to cabinet sides and bottoms

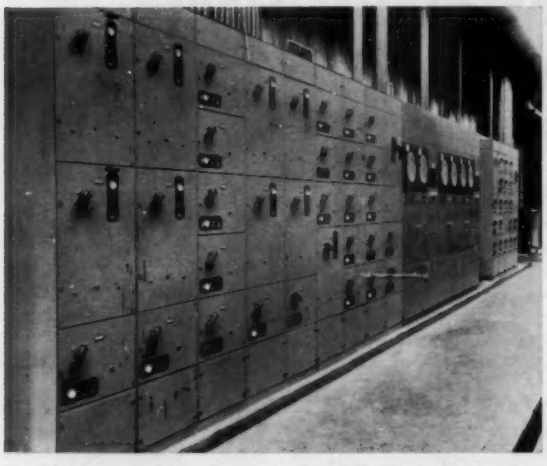


Fig. 4. Central control panel for both black and white paint systems. All motors, ovens are controlled from here

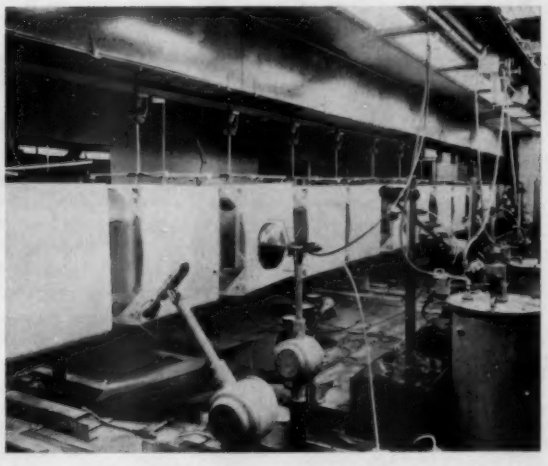


Fig. 5. Electrostatic spray guns along conveyor line in spray booth. One and one third mil finish is applied

Fig. 6. Carrying racks are stripped of paint by dipping in 900 F salt bath

Fig. 7. Triple-tier storage racks in storage room hold drums of paint and thinner readily available for mixing

Left: Five categories of inventory materials are separated and controlled by assigning a Robot-Kardex unit to each one. Above: Close-up shows push-button controls of unit which permit speedy reference and posting

Inventory Control of Many Parts

Was Once a Chore, Now a "Snap" for Pioneer

By W. C. OLSON, Mgr., Pioneer Engineering Works, Inc., Minneapolis, Minnesota

WHEN ONE OF your products takes up as many as 11 freight cars in shipment, you are automatically involved in an inventory control and purchasing problem of substantial proportions. You don't have to misjudge by much to create an unbalanced inventory, and only the most effective management controls will insure against it.

The true meaning of these facts have been brought home sharply to us during the past two years. Within that short space of time, we have been able to reduce capital tied up in inventory by fully one-third.

A large proportion of orders are for our portable units—roll crushers, jaw crushers, gravel plants and asphalt plants, though we also produce a heavy volume of stationary equipment, to order, for quarries, mines and cement plants.

Our inventory must necessarily be large—some 17,000 items to be exact. By the same token, of course, we have to guard against a situation in which capital is tied up unnecessarily. As production expanded, we took the easy way out by permitting the different departments to control their own inventories. The result, of course, was that ultimately "control" was being exercised from five different places.

To improve this situation, we examined a wide range of available methods and found we could do the job best with a Remington Rand Robot-Kardex system. Five Robot-Kardex units house the new centralized set-up, serving as tools which have enabled us to effect savings in seven figures in two years.

Our material requirements are extremely fluid. A single order for one of our products will immediately create a big need for materials. By the same token, as we do not produce to a large finished goods inventory, it would be entirely impractical to keep large stocks on hand.

In most cases, therefore, every entry on our records reflecting stock usage requires experienced judgment as to whether an order for the item in use should be initiated, and if so, in what amount. This is not a clerical posting operation; our records must be handled by full-fledged materials controllers. Each of our men are specifically trained in a particular phase of the stock used in making our products.

For the greatest possible coordination of materials and production planning, we send the inventory control section a full bill of materials on every order. These are checked off against inventory prior to beginning production, assuring us that we are free to go ahead without running the risk of delay for lack of materials. The mechanized Robot-Kardex units reduce the time required to check even the most complex bill of materials, so that this method of operation, which we consider essential in our business, puts no strain on the materials controllers.

Our stock is separated into five categories: castings, steel, finished articles on which no fabrication is necessary in our plant, small sub-assemblies going to finished products, and machined parts other than castings.

Each item used as a component in our finished equipment is assigned to a separate Kardex pocket. A single raw casting may take as many as five or six different machine finishes, which equip it for different uses. In this case, there would be a pocket set up for the basic casting, and possibly one of the finishes in the section where it is used most widely. Cross-references tell us of the other equipment on which the finishes are used, and they in turn refer back to the basic casting.

Two cards fit into the upper half of the pocket. The first is a purchase order requisition and control. This permits us to follow an order from requisition through purchase order, and keep track of receipts until all deliveries are made.

The second card is a usage record set up to summarize consumption of the item for four consecutive years. We keep a record here of usage in the production of new equipment, as well as in replacement part orders. This card is an important factor in our ability to hold stock to a reasonable minimum. The materials controllers study this accumulation of data every time they consider the feasibility of re-ordering, basing their judgment on past history as well as on their knowledge of current conditions.

(Continued on page 210)

Freon Unit With Monorail Mobility—

"Cool" Idea for Charging Freon into Chrysler Div. Cars

AIR CONDITIONING is a subject that is important to plant engineers, and rightly so. They are the men involved in the installation, operation and maintenance of related equipment, usually dealing with stationary systems. At the Chrysler Division plant of the Chrysler Corporation, the plant engineer not only has his space cooling responsibilities but those pertaining to automotive air conditioning systems.

Certain percentage of cars coming off the assembly lines are equipped with refrigeration systems which have to be checked, charged and operated in the vehicle before the car is ready for shipment. The assignment to design and expedite the means to do these operations quickly and efficiently was given to the plant engineering department. The completed job has some interesting if not unusual features.

Concrete stalls were constructed side by side in the plant. Into these, the new cars are driven for work on their comfort cooling system. To check each system for leaks, it is charged with a mixture of Freon 12 and nitrogen. Any leaks are detected with the aid of an electrical detector which picks up the halogen element in the mixture and puts out a warning sound.

Gas mixtures for leak testing come from a mixing cabinet located at one end of the refrigeration system testing and charging stalls, Fig. 4. This enclosure contains two tanks in which the gases are mixed and held; while one of these is in service, the other is kept in reserve, Fig. 3. Nitrogen and Freon are fed into the mixing tanks from standard supply cylinders connected to flexible hoses.

Whenever it is felt necessary, pressure in either one of the mixing tanks can be increased by turning on one or two infrared lights located above the vessels.

The mixed gases from the cabinet flow into a relatively large diameter run of tubing; branch lines from this extend into the stalls. Each stall is equipped with a manifold and it is through this that the gas travels to the refrigeration system in the car. This same manifold, which is equipped with two gages at each end and three shut-off valves, is also used to charge Freon and to pull a vacuum on the car's system, Fig. 5. This is done by making quick changes in the hose connections with quick-break sockets.

Prior to the charging of the Freon, the operator in the stall makes the necessary hose changes to pump a vacuum on the comfort cooling system. For this purpose, he sets a time clock which will automatically cut off the vacuum pump after the set interval; then he starts the pump motor. The vacuum that is reached is about 28 in. of mercury.

When it comes to charging the system in any of the stalls, equipment mobility plays an important part. Freon travels from stall to stall in a cabinet suspended from an overhead monorail, Fig. 2. Two 100 lb cylinders of refrigerant are transported in this compact cabinet in addition to a metering cylinder into which a desired amount of Freon is transferred automatically.

Fig. 1. Metering unit is visible through window at right

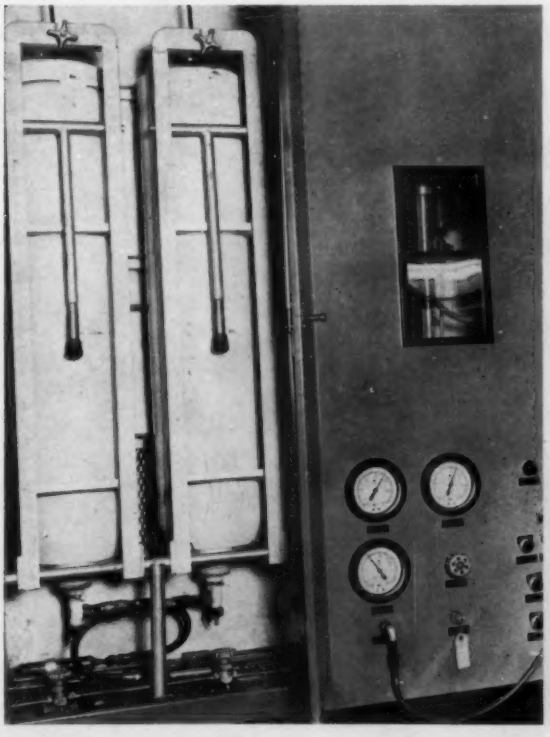
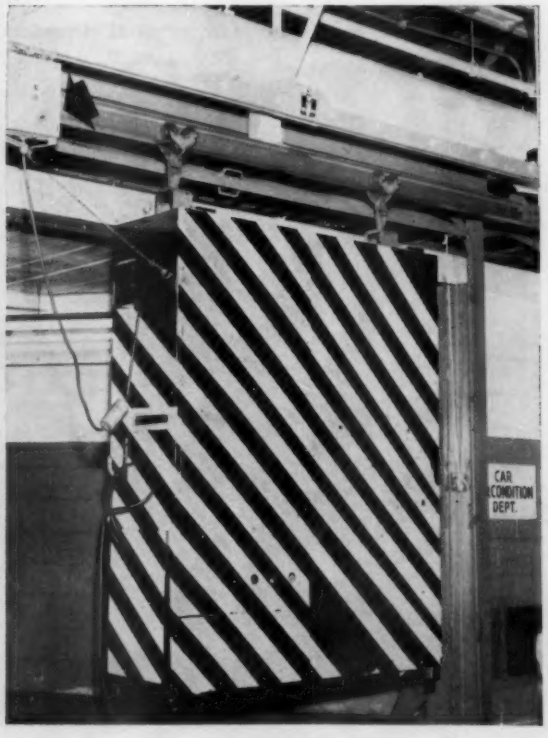


Fig. 2. Duct power pickup is seen in rear view of the cabinet



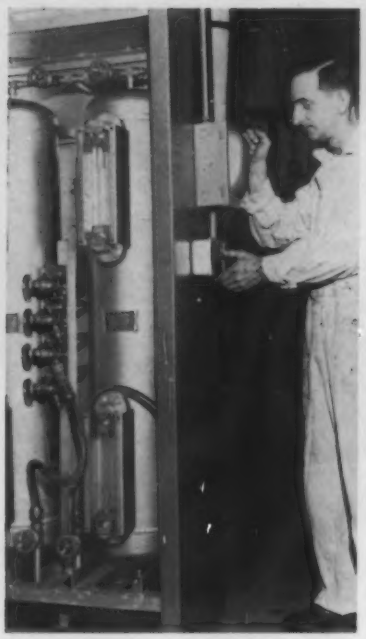


Fig. 3. Tanks for mixing of test gases

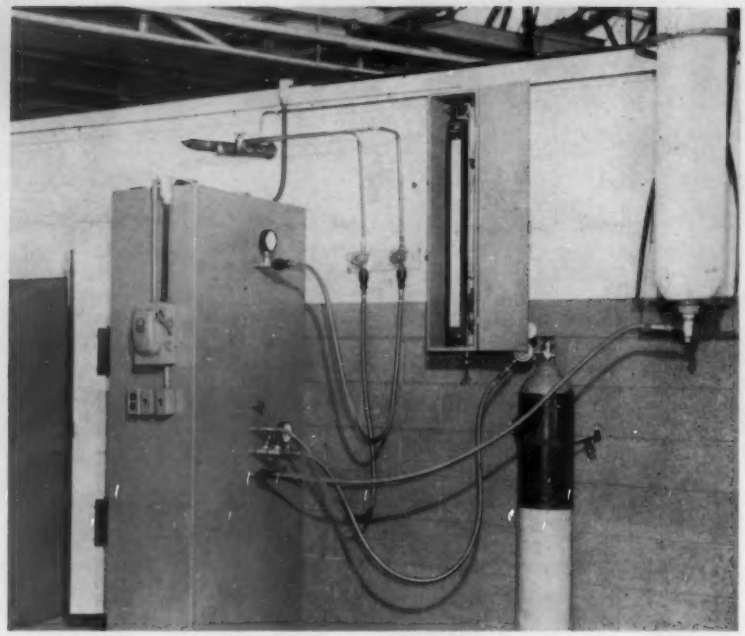


Fig. 4. Freon and nitrogen cylinders connected to mixing unit at end of stalls

To get a charge of refrigerant out of one of the supply cylinders, the operator adjusts the glass metering column, Fig. 1, which is visible through a window in the cabinet, to a calibration that will produce the desired quantity.

He then trips an electric switch on the cabinet panel pertaining to the control valve for one of the cylinders and the Freon starts flowing into the metering tank. As soon as a float in the glass metering column comes up to the prescribed amount, it interrupts a photoelectric light beam and Freon flow from the supply cylinder is automatically stopped. An electric light on the panel goes on, indicating that the metered quantity of Freon is ready for charging.

To start the flow of the refrigerant from the metering cylinder, the operator punches a designated electrical button on the panel; an indicating light goes on at the same time and remains illuminated until the charging process is completed.

Fig. 5. Operator's hand is at right of manifold used in checking, pumping, filling the vehicle refrigeration systems

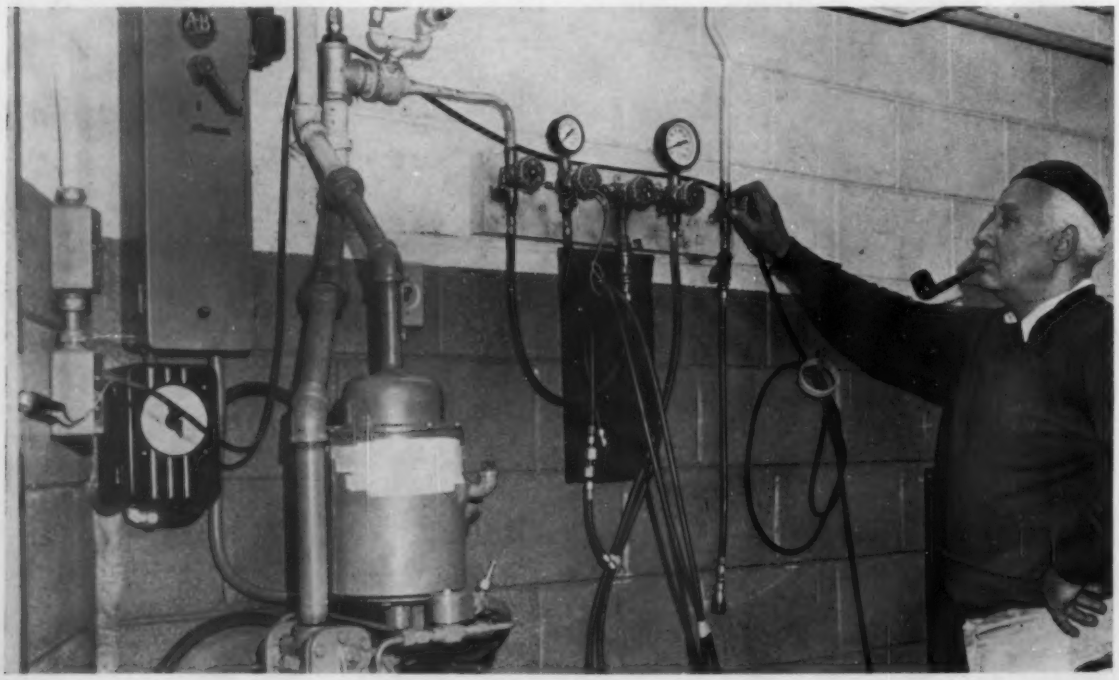
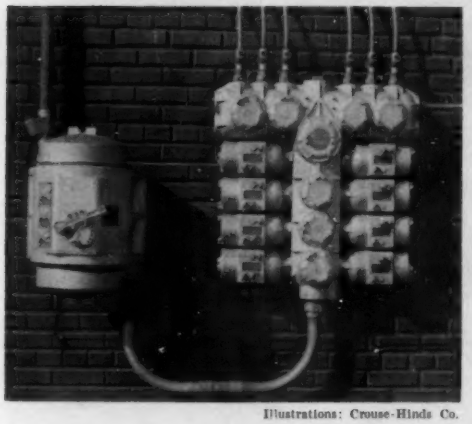
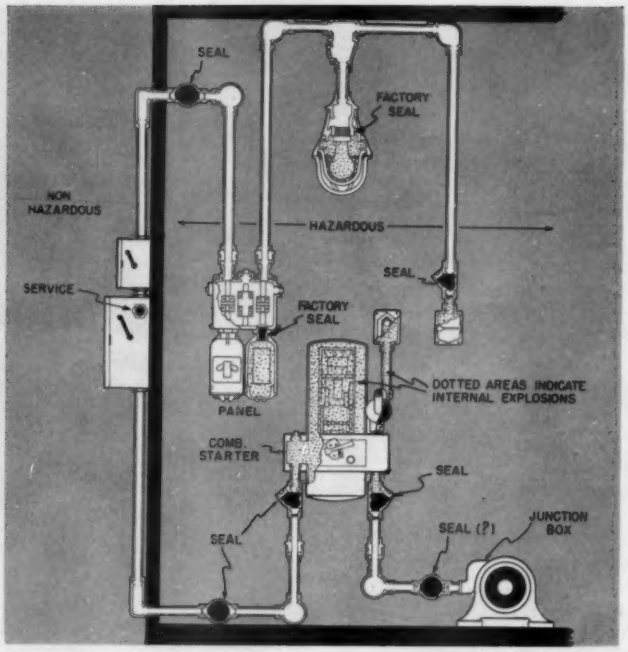


Fig. 1. Right: Drawing shows how explosion-proof enclosures and good layout of seals protect the electrical system. Seal in the lower right corner is required only if the conduit is two inches or larger



Illustrations: Crouse-Hinds Co.

Fig. 2. Above: Typical example of Class I explosion-proof device is this main circuit breaker and panel board. Circuit breakers are housed in individual cylindrical-shaped compartments alongside the T-shaped panel



Electrical Equipment for Hazardous Areas

When to Use Explosion-Proof or Dust-Tight Equipment

ALTHOUGH NO confusion exists among maintenance engineers about the explosive effects of volatile gases, vapors or combustible dusts at hazardous industrial areas, mistaken notions do exist concerning the selection of particular types of electrical equipment designed to prevent such explosions.

One important condition frequently overlooked is that hazardous industrial areas, as described by Article 500 of the National Electrical Code, include not only those areas where flammable gases or vapors are in the air in high enough amounts to explode, but also areas where combustible dusts are present and mixed well enough with the surrounding atmosphere to explode and burn.

In other words, explosion-proof electrical equipment will not always solve your safety problems. Sometimes, you will need explosion-proof equipment, sometimes dust-tight equipment, and sometimes a combination of both types.

As a result, proper selection of equipment depends upon the type of hazard encountered. The National Electrical Code divides hazardous atmospheres into the following classifications: Class I, explosive atmospheres consisting of flammable gases or vapors; Class II, combustible atmospheres consisting of explosive amounts of dust; Class III, atmospheres containing easily ignitible fibers or flyings (such as cotton linters, rayon, jute or excelsior) which are not likely to be in suspension in air in sufficient amounts to produce ignitible mixtures.

Class I and II are subdivided into groups according to the particular gas, vapor or dust involved. The groups under Class I include atmospheres containing the following substances: Group A, acetylene; Group B, hydrogen or gases and vapors of equivalent hazard; Group C, ethyl ether vapor; Group D, gasoline, petroleum, naptha, alcohols, lacquer solvent vapors, and natural gas.

Combustible Dusts

The combustible dusts in Class II atmospheres are: Group E, metal dusts; Group F, carbon black, coal or coke dust; and Group G, grain dusts.

Only Class I hazardous areas, containing explosive amounts of flammable volatiles, require explosion-proof electrical equipment. But this does not mean that such devices are gas-tight. There are too many joints in the raceways and enclosures of a wiring system to make such a solution practical. The answer instead is to allow electrical arcs, sparks or excessive heat to explode any vapors that seep into an explosion-proof device. Because the device is very strong and has precisely machined threaded or flanged joints, only harmless, cooled gases can escape from it. In addition, each explosion-proof enclosure is sealed off from the rest of the conduit system by sealing compound to prevent the explosive effects within the enclosure from travelling throughout the conduit system.

Electrical devices suitable for Class I locations, however, are not necessarily suitable for Class II and III. It is possible that an explosion-proof device suitable for use at Class I locations would, when blanketed by dust, exceed the temperature requirements of Class II locations.

Unlike an explosion-proof device, to overcome the hazards of combustible dusts a Class II electrical enclosure must be dust-tight. It also has to withstand the insulating effects of dust. Otherwise, a constant source of dust can eventually cover exposed electrical equipment with a thick dust blanket which, acting as an insulator, stores heat inside the enclosure. Once the device is hot enough, the dust blanket ignites—setting off a fire.

The process of selecting the correct electrical equipment boils down to just one rule: define the types of hazards, both actual and potential, that exist at your plant, then pick the proper equipment to counteract those hazards.

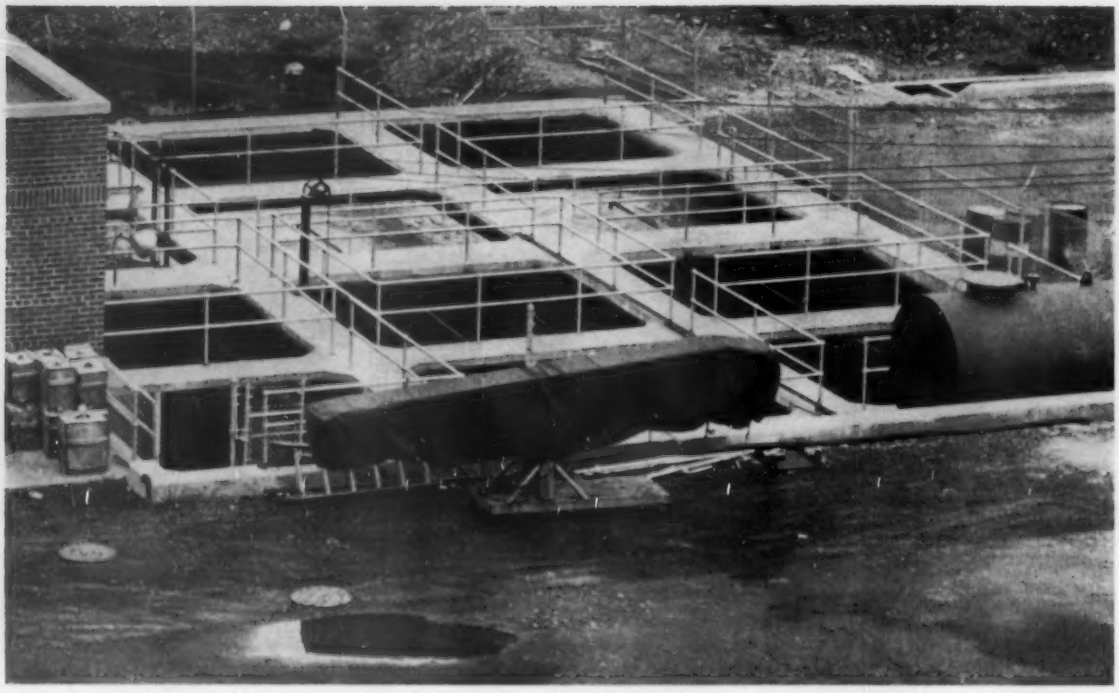


Fig. 1. Over-all view of waste disposal plant, comprising two 150,000 gal tanks, each able to treat one day's waste effluent

SPS Halves Waste Disposal Costs

New Treatment Cuts Sludge Volume 55 Per Cent

By HOWARD K. FITTING, Standard Pressed Steel Co., Jenkintown, Pa.

Disposal of solids from waste treating plant was a problem of materials handling at SPS . . . Sludge has to be hauled, and it's heavy . . . Process changes to replace gaseous chlorine with liquid sodium hypochlorite cut the sludge (and the problem) 55 per cent

EFFECTIVE sludge disposal is a very real problem at Standard Pressed Steel Co., but about a year ago we did succeed in reducing the problem to 45 per cent of its former size.

This reduction was accomplished by changing our chlorination method for getting rid of cyanides from plating room wastes. Formerly we used chlorine gas—with caustic soda for alkalinity—but now a solution of sodium hypochlorite is introduced at the beginning of the treatment cycle.

This new method will, we estimate, cut our sludge disposal bill from about $4500 to $2000 per year.

The weight of sludge produced is about the same as before, but the sludge is more compact and takes up less than half the space once needed. The capital investment—consisting primarily of a tank for the hypochlorite—will be paid off by the savings in sludge disposal costs. At the same time, the sodium hypochlorite gets rid of all of the cyanide in the waste effluent.

At Standard Pressed Steel Co., manufacturers of fasteners, steel shop equipment and aircraft specialty parts, we operate a completely modern $1,000,000 plating room. About 90 per cent of the wastes which require treatment originates in the plating room. It includes cyanides, cleaners, cadmium, zinc, silver, copper, tin, nickel and hydrochloric, sulfuric, nitric and chromic acids. The remaining 10 per cent is made up of quenching oils, cleaners, pickling solutions and phosphate solutions from heat treating and tumbling and the paint line washer.

To take care of these wastes we built a $200,000 waste disposal plant which went into operation in November 1951. It is a modified "fill and draw" type of plant using two 150,000 gal tanks for chemically treating the wastes. Each tank, which is used alternately, can take care of one day's waste. The plant is designed so that daily capacity can be increased to 300,000 gal.

In treating the wastes, the insoluble oils are first skimmed off and sent to a centrifuge where they are clarified for plant reuse. The day's batch is then tested to determine the amount of chemicals needed for treatment. Sodium hypochlorite solution is put in to destroy the cyanides. Ferrous sulphate is added. Then either lime or caustic soda (depending upon the waste analysis) is dropped in to bring the alkalin-

ity up to a pH of 8.5 to 9, to conform with State regulations. The solution is agitated by air for 30 minutes to assure thorough mixing of the chemicals.

The solution is allowed to settle for a minimum of four hours, during which the objectionable wastes are precipitated to the bottom of the tank as sludge. The effluent is pumped off to one of two 150,000 gal lagoons, held in storage for 24 hours, and checked for cyanide content. It is then released by gravity into Tookany Creek, which eventually flows into the Delaware River.

Floating Outlet

The outlet for the effluent is located just above the sludge line in each treatment tank, to permit removal of the maximum amount of effluent from each day's batch. Ordinarily, it would require waiting until the precipitate had completely settled before draining off. To get around this we attach one end of a rubber hose to the outlet and the other end to a floating steel barrel so that it is just below the surface. In this way we can start draining off the effluent shortly after the solids begin to settle.

The sludge resulting from the purifying operation moves through a series of two tanks for compaction and ends up in one of three drying beds. When a drying bed fills up, the sludge is then hauled away.

When the gas chlorination method was used for destroying cyanides, the wastes were first treated with ferrous sulphate and lime, and after the precipitate settled the effluent was pumped to a chlorination tank. After treatment with chlorine gas, it moved to the effluent lagoons.

Since chlorine interacts with water to form hydrochloric acid it was necessary to place a caustic soda tank ahead of the chlorinator to raise the pH above 8.5. Neutralization of the acid required 1.4 pounds of caustic soda for every pound of chlorine.

The caustic soda tank and piping system had to be cleaned out once every six months at a cost of from $150 to $200 per year. The volume of sludge which accumulated filled up one of the three sludge beds every twelve months. Cost to remove the sludge in dump trucks was about $4500.

Use of the sodium hypochlorite eliminated both the chlorination tank and the caustic soda tank, and this saved the cost of cleaning the caustic soda tank. As pointed out previously, the sludge from the hypochlorite method takes up only 45 per cent as much space as sludge from the old method—cutting sludge disposal costs by the same amount.

Fig. 2. Tank holds 2500 gal of sodium hypochlorite for treating cyanide wastes

It was found, too, that by first destroying the cyanides with sodium hypochlorite there was no longer any trouble with the formation of complex soluble iron cyanides in the effluent. After chlorination, these iron cyanides either would be precipitated as metal hydroxides in the effluent lagoons—and eventually would have to be cleaned out—or would be carried into the stream in soluble form.

Chemical Consumption Cut

The sodium hypochlorite treatment costs no more for materials, largely because ferrous sulphate consumption is cut from 600 lb to 350 lb and lime from five bags to two bags for each day's batch. Needless to say, the chlorine in sodium hypochlorite is much safer than chlorine gas and is easier to handle, with sodium hypochlorite having the further advantage of not affecting the pH of the waste solution.

Our sodium hypochlorite solution is supplied in 1300-gallon tank trucks and is pumped directly into the 2500-gal storage tank. Each truck load lasts about four weeks. The solution contains 16 per cent available chlorine by weight. Feed from the storage tank into the treatment tanks is by gravity.

Our experience with sodium hypochlorite is part of a research program on waste treatment, the long-term objective being to so purify the wastes that we will be able to reuse the water in plant processes. The total destruction of cyanides by the sodium hypochlorite treatment puts us far along the road in reaching this goal. If we are successful, we may be able to save $25 per day on our water bill.

Our plans also envisage baking the sludge in a specially designed burner so that only a small amount of dried-out precipitate remains. If and when this is accomplished, the remaining 45 per cent of our sludge disposal problem will have been solved.

Fig. 3. Steel drum acts as float to support drain hose just below surface of water

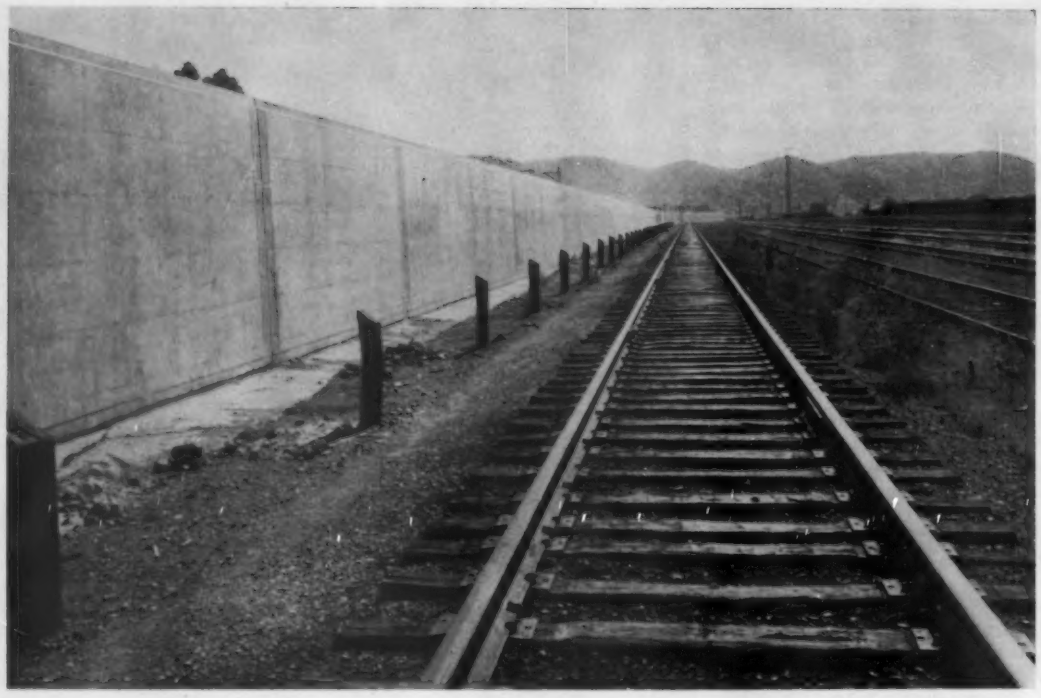


Fig. 1. Extending 7290 ft along the shore of the Ohio River at Portsmouth, Ohio, this concrete flood wall protects the community from rising waters. Top of wall is three feet above highest flood crest ever recorded in the area

Shoreline Construction

III—Retaining Walls, Flood Walls, Bank Protection

By C. W. GRANACHER, Project Engineer, Contracting Division, Dravo Corp.

CONSTRUCTION, improvement or maintenance of shorelines is frequently the problem of plant engineers of industries located on or near inland rivers, canals and lakes. Just what to do depends entirely on the specific problem at hand. Generally, however, the problem usually falls in one of three classes:

1. Retaining walls. Holding the property out of the waterway.

2. Flood walls. Holding the waterway out of the property.

3. Bank protection methods. Maintaining a status quo between the waterway and the property.

Most engineering structures, like the people who build them, vary greatly in appearance. It is seldom that two bridges, though serving the same purpose, are built alike even when the distances they span are nearly the same. Likewise, while all waterside retaining walls serve one purpose: namely, to give a vertical or near vertical face to a shoreline for some needed height above water level, this can be handled in several ways.

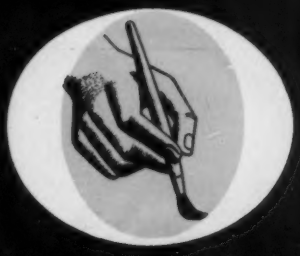
In times past, the usual method was to build a stone masonry or concrete wall. Depending on its height and the type of sub-soil, the wall would be supported on a spread footer, bearing piles or bed rock.

In recent years, a growing number of walls have been built of an entirely different material; namely, steel sheet piling. Retaining walls constructed of this material are usually either a steel sheet pile cellular structure or a tied-back wall. The first type is frequently used in connection with steel sheet pile cellular docks, the cells being joined together for some length along the dock face, making in effect a retaining wall.

The second method is being used more frequently since the introduction of the heavy Z-type piling, which can span greater distances because of its high beam strength. A good example of this tied-back type of retaining wall is the new wharf Dravo Corp. constructed in connection with Pittsburgh's Redevelopment Program.

This project calls for the creation of a park to be located between the Allegheny and Monongahela Rivers where they join to form the Ohio. This area is the famous Pittsburgh Point. The wharf, designed by Clarke & Rapuano, New York City, rims the new park, extending around the point and up both rivers a total distance of 2400 ft. The face is a row of MZ-27 steel sheet pilings of 25- to 31-ft lengths, driven so their tops are one foot above average water level. The piles are capped by a reinforced concrete beam, or wall, 3 ft thick by 4 ft high.

To give stability against overturning, the sheet pile wall is tied back by 2-in. round steel rods at 6-ft and 7½-ft centers. These rods are anchored to a continuous reinforced concrete beam 45 ft behind the wharf face. The anchor wall is supported on vertical and battered wood pile, a pair of which are used under the wall at the location of each tie rod. The whole area behind the concrete wall that caps the Z piling is graded and paved. The river bed in front of the wall is dredged to



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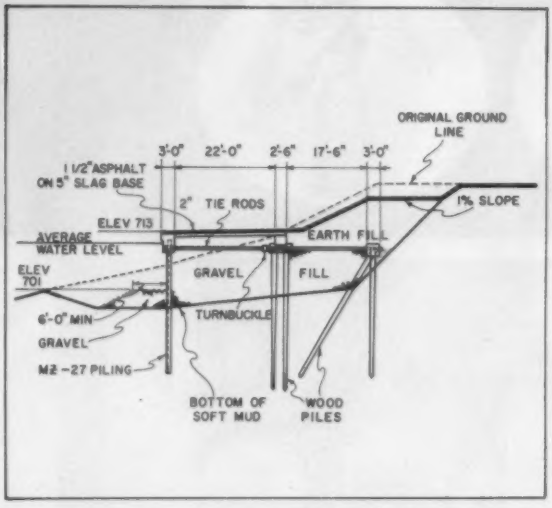

Fig. 2. Here is a good example of the tied-back type of retaining wall constructed along the Point in Pittsburgh, Pa.

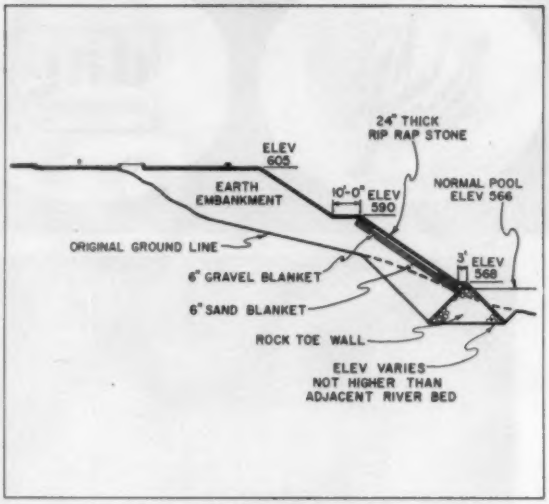

Fig. 3. Sketch shows how shoreline along the Kanawha River, near Charleston, West Virginia was paved with riprap

provide 10 ft of water so boats can dock against it. This type of construction makes a very strong structure and one of pleasing appearance.

Flood Walls

The second type of wall mentioned is the flood wall. These are built, often by the U. S. Army Corps of Engineers, to protect riverside communities and developments. They are usually either earthen dikes or concrete walls. The famous Mississippi River levees that extend for hundreds of miles are notable examples of the first type. They are comparatively economical to build, but must be quite wide in relation to their height to be stable.

Where such ground area is not available, the concrete wall is often used instead. It must be designed, of course, to fit the location of its use and type of foundation material encountered. As a flood wall is designed to hold back the water, it is very important that this same water is not permitted to seep under the wall and either flood the land side or soften the foundation material which might cause the wall to fail. This seepage is usually prevented by constructing a cut-off wall near the water side of the footer that extends down to an impervious layer of earth, usually a clayey material. If the depth from bottom of foundation to the impervious material is small, the cut-off wall usually is constructed of concrete, but greater depths are most often sealed by steel sheet pile cut-off walls.

Fig. 4. Section along five miles of the Kanawha River, sketched in Fig. 3 above, shows finished job of stabilizing shoreline, making it steeper than original slope

Another phase of shoreline construction to consider is bank protection. Several methods are available to stabilize a section of shoreline. If erosion is the culprit, an often used solution is to build groins or jetties out from the shore to force the current away from the bank. Another method would be to cover the eroding shore with mattresses built of willow poles, asphalt or articulated concrete. The latter two types gain their flexibility and resistance to erosion from steel cables embedded in them. Both of these methods are widely used by the U. S. Army Corps of Engineers to control bank erosion on the Missouri and Mississippi Rivers.

When it is necessary for the shoreline to be steeper than the slope it normally stands on, frequently the slope is paved with heavy riprap stone. Charleston, West Virginia used this method to improve about five miles of its river bank along the Kanawha River and a very stable and beautiful result was obtained.

Protection Against Wave Damage

Wave damage to shores and shore structures, particularly those of lakes, is often controlled by building seawalls. It is very important that these be built deep enough to prevent being under-cut or scoured out by the water action. Often they have a curved face to throw the waves back on the water. This would be another place where steel sheet pile cells might be used advantageously. They have been used in quite a few instances for this purpose, particularly on the Great Lakes.

Any shoreline structure must be engineered to do the job at hand, and all methods should be studied to find the best and most economical one.

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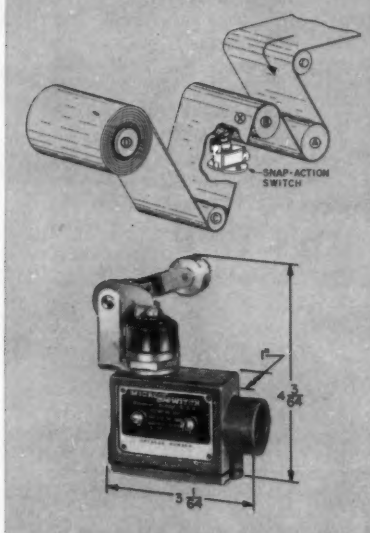
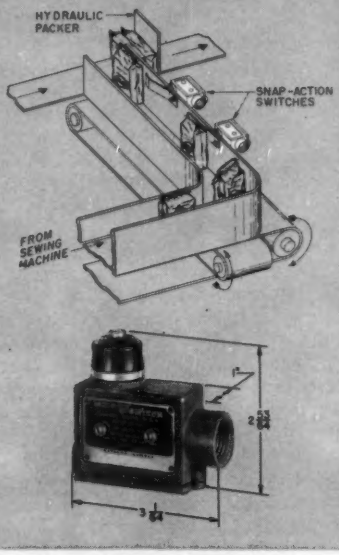


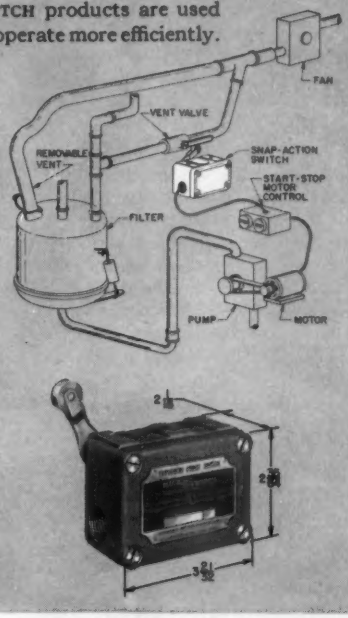
Assures tension on fabric shearing machine

• Fabric travels over rubber take-up rolls "**A**" and "**B**" to spreader roll "**C**" and on to batch roll "**D**". The batch roll is controlled by a slip-type take-up clutch. Tension is manually added as the roll builds up. If tension is not added soon enough, the fabric slacks at "**X**". The switch is mounted beneath take-up roll "**B**". When the slacked fabric starts to rewind, it actuates the switch which stops the machine and prevents damage.



Prevents jamming of feed conveyor

• Two switches installed on this feed conveyor prevent bags of sugar from piling up when the hydraulic packer jams. The switches are wired into the control circuit so that they operate independently as each bag passes. When bags pile up, both switches operate simultaneously, shutting off the conveyor. This ingenious arrangement prevents torn sugar bags and damage to sewing machines.



Explosion-proof switch protects personnel

• If the vent valve on this filter system is left open while the pump is running, a highly injurious chemical drains on to personnel working below. To make it impossible to start the pump motor with the vent valve open, an explosion-proof switch was wired to the motor control. Now the pump cannot be started unless the valve is closed. The explosion-proof switch is unaffected by hazardous atmospheres.

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Dial Gages—

How to Install and Maintain Them

By LEO WALTER, Consulting Engineer

SUCCESS OR FAILURE with instruments begins with the selection of gages for particular jobs. It is poor practice to take a gage from the shelf and use it unless it has been ordered and stored for the purpose intended, in which case it became an individual spare part.

When a spare gage is taken from general stock its construction should be known and whether the materials used (for the Bourdon element etc.) are suitable for the job. A card index should reveal the range of the gage, and the lettering on the dial should give some indication of possible uses.

The scale range should usually be twice that of the working pressure; the gage lasts longer and its pointer is in the best position for reading.

Strain and Vibration

Gages mounted on walls or panels should be free from piping strains. Loops in the impulse piping or a length of flexible tubing permit expansion and contraction of a pipe or plant equipment with change of temperature, without subjecting the gage to strain. Mechanical vibration is another disturbing factor and if a machine vibrates noticeably it is advisable to mount the gage on a wall or column nearby. Dirt, moisture and fumes are also to be avoided. Ordinary gages are not "tight" and therefore unsuitable for severe working conditions.

The pressure element must be protected from becoming filled with steam or with corroding gases or liquids. A siphon is used for steam gages, filled with water before installation. When the system is subject to occasional vacuum a piping leg should be fitted which remains filled, and its head effect should be compensated by resetting the pointer. Membrane gages can be protected from corrosive fluids under pressure by coating the membrane or by inserting protective thin membranes made from suitable material. Sometimes special sealing vessels are applied to keep corrosive liquids away from the mechanism.

Pressure gages can be protected from rapid pressure fluctuations by using damping devices such as capillaries, labyrinths, check valves, as shown in Fig. 2.

The use of three-way cocks is recommended because it facilitates a zero test being made. Gage cocks should be used carefully. Too quick opening can strain or rupture the gage tube, bellows or membrane. The same detrimental effect can be expected from sudden pressure release, for example on hydraulic presses. The best protection is a pressure relief valve.

Proper maintenance of pressure instruments begins with proper selection, standardization and with careful installation. Gages for acids or caustics should be marked on the dials as such, and installed with shut-off valves so that they can be safely removed.

Before checking a pressure gage, the accuracy required should be known. Commercial accuracy usually means plus or minus 1 per cent of total range, to be achieved within the middle 60 per cent of the range, or plus or minus 2 per cent at the lower and upper portion of the scale. The checking may be accomplished either by comparison with precision test gages, or by checking against a dead weight testing machine.

Dial thermometers require all the care in handling, fitting and use that should be given to pressure gages. They are very similar instruments—the thermometer being, in fact, an instrument for measuring the increase in pressure of the filling medium as its temperature rises. The filling can be mercury or other liquid, or a gas, but the instrument must remain completely sealed.

Where possible, sheaths or thermometer wells should be used to permit easy withdrawal of the instrument without having to empty the vessel. Pockets should, however, be thin-walled in order to reduce thermometric lag. Filling the space between stem and pocket with mineral oil or metal filings is advisable. Extra length of the capillary must be coiled in a large radius and secured to prevent a damaged capillary tubing putting the thermometer out of action.

Where instrument panels are used, it is advisable to mount the panel on anti-vibration mountings. When these are used it is essential that there are no rigid connections between the panel and the source of vibration or the effect of the mountings will be very much reduced. Piping must be flexible and may be of rubber or small size metal tubing coiled into a spring shape.

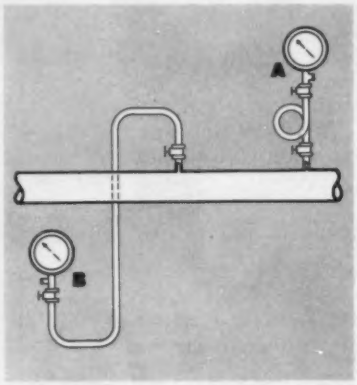

Fig. 1. Two means of protecting steam gages. A, pressure tap on top of pipe; B, mounting gage on water-filled siphons

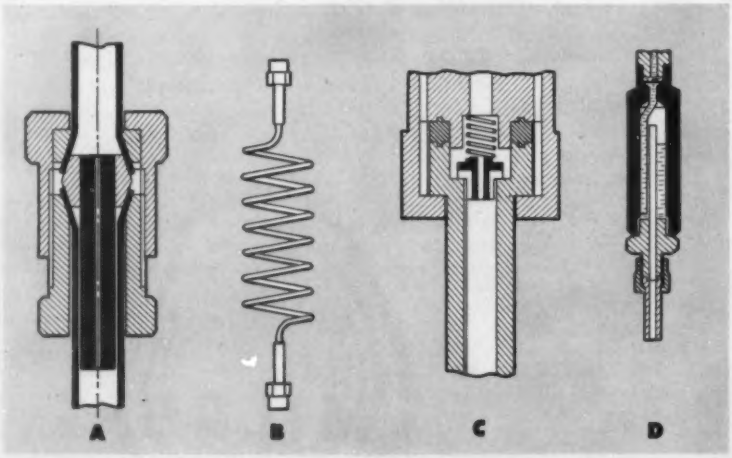

Fig. 2. Damping devices to offset pressure fluctuations; A, small bore plug; B, coiled tube insert; C, check valve insert; D, sealed pressure tube element

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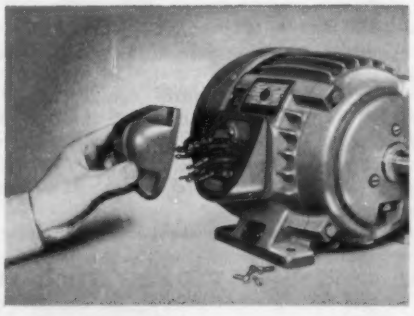

The conduit box is a heavy duty, cast-iron, diagonally split type, neatly contoured and easiest of access. It is fitted with a special gasket and is anchored to the case with four screws. Leads are positioned, lugged and clearly marked. The box can be rotated to any of four positions.

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Heaters Provide "Southern Comfort" to Plant with No Central Heating System

LIKE MANY OTHER industrial concerns in the South, the plant of the Hunter Fan and Ventilating Co., Memphis, Tenn., is not equipped with a central heating system. A new building, 350 ft by 420 ft, with 108,000 sq ft of floor space, it is a single story, concrete block structure, faced with brick, with built-up roof. One-sixth of its total wall space is in window areas.

Construction, operation and maintenance of a steam or hot water system were not considered to be justifiable from a cost standpoint, since heat would be needed only for short periods of time. Effective control of such a heating system would be practically impossible due to the wide and sometimes rapid fluctuations in temperature—when steam or hot water temperature was built up to "take the chill" from the working area, it would become an excess heat factor when the sun's rays would penetrate the building.

A study of temperatures over a five-year period showed that "chill" conditions were not uncommon for approximately 100 days of each year.

Calculating the heat loss in the structure to be 7,400,000 Btu per hour, Hunter installed five Dravo "Counterflo" heaters, each with a capacity output of 1,000,000 Btu per hour; four heaters, each with 500,000 Btu output; and one heater with 400,000 Btu output.

All were installed overhead to conserve floor space for working purposes, and were vented through the roof.

Two of the larger heaters were installed in the machine shop area, two were installed in the assembly area, and the fifth was installed in the storage area.

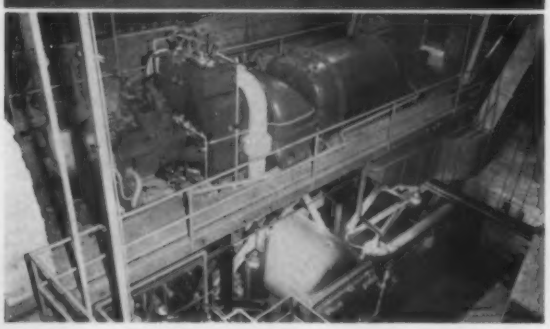
Heaters with 500,000 Btu output were installed in the Attic Fan manufacturing area, parts and service area, shipping floor, and stock room. The 400,000 Btu unit was installed in the plant tool crib area.

Controlled by thermostats, the heaters provide a maximum working temperature of 70 F, with little or no attention required by maintenance personnel.

Simple "Boiling Water" Reactor Powers Atomic Plant at Idaho Test Station

AN ATOMIC POWER PLANT employing a boiling water type nuclear reactor is in operation in the United States. Details of the design, construction, and operation of this reactor were described at the United Nations' International Conference on Peaceful Uses of Atomic Energy by Dr. Walter H. Zinn, Director of Argonne National Laboratory.

The nuclear power plant was constructed at the Atomic Energy Commission's National Reactor Testing Station in Idaho in the fall and winter of 1954-55 by Argonne National Laboratory scientists and engineers. The development of the boiling reactor, in which steam is generated directly in the reactor vessel, has reduced the process of transforming nuclear energy into usable electric power to its simplest terms.



Nuclear power plants, as the first step in making electricity, transform the nuclear energy into steam which can be used in steam turbines of conventional types. The simplest way of making the steam is to immerse a nuclear reactor in a tank of water. As the reactor heats up because of the release of nuclear energy, it boils the water, and steam may be drawn off from the tank.

The nuclear power plant consists of a boiling water reactor, a 3,500 kilowatt turbo-generator, a steam condenser, a cooling tower, and control equipment. The reactor consists of 87 fuel elements made up of aluminum and enriched uranium (90 per cent) plates, suspended in water in a stainless steel tank 16 ft high and 4½ ft in diameter. Fully loaded, the reactor requires about 12 kilograms of uranium 235.

The reactor is made critical by the partial withdrawal of the control rods. The power level of the reactor is then brought up to approximately 1,000 kilowatts. This is sufficiently high so that boiling takes place in the channels of the core. When the operating power level and pressure are reached, the steam delivery valve is opened and the machine is in normal operating condition. Steam from the reactor vessel is carried by a six-inch pipe to a turbo-generator. The condensate from the condenser is returned to the feed water supply tank.

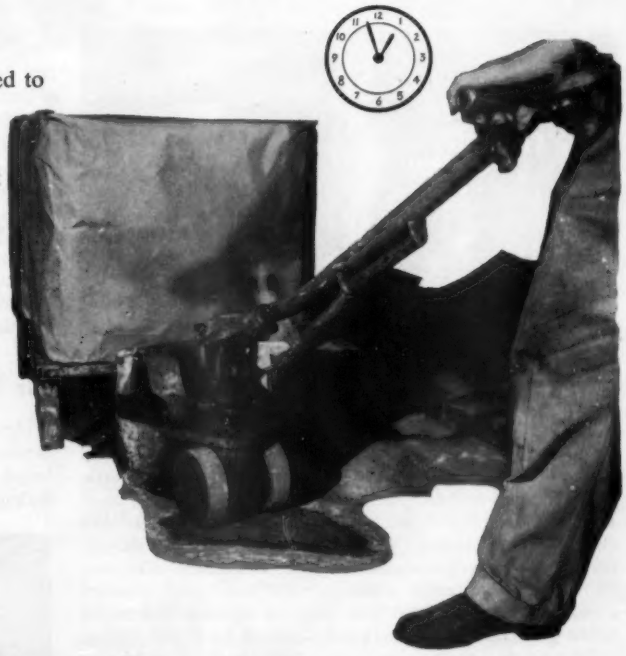
The reactor has been in operation during the past two months operating at a thermal power of 15,000 kilowatts, and the atomic power plant produces a net of 2,000 kilowatts of electricity.

Repair concrete floors with KWIK-ROC

45 MINUTES FROM TROWELING TO TRAFFIC!

With KWIK-ROC you can actually repair concrete floors while plant personnel are out to lunch. No need to hold up or detour plant traffic . . . no lost time or restrictions on floor area.

KWIK-ROC, an amazing new floor patch, sets to almost *double* the compressive strength of ordinary concrete within 45 minutes after pouring. The patch is actually stronger than the surrounding floor. Handles like ordinary cement. KWIK-ROC is recommended for patching and repairing interior concrete floors (NOT recommended for floors subject to constant spillage of water or acids.) For complete information, address Dept. H14-95.



A Subsidiary of Sun *Chemical Corporation*

A. C. Horn Co., Inc.

10th Street and 44th Avenue, Long Island City 1, N. Y.

DIVISIONS OF SUN CHEMICAL CORPORATION

HORN • **HUDSON** • **WILLEY** (paints, maintenance and construction materials, industrial coatings) • **WARWICK** (textile and industrial chemicals) • **WARWICK WAX** (refiners of specialty waxes) • **RUTHERFORD** (lithographic equipment) • **SUN SUPPLY** (lithographic supplies) • **GENERAL PRINTING INK** (Sigmund Ullman • Fuchs & Lang • Eagle • American • Kelly • Chemical Color & Supply Inks) • **MORRILL** (news inks) • **ELECTRO-TECHNICAL PRODUCTS** (coatings and plastics) • **PIGMENTS DIVISION** (pigments for paints, plastics, printing inks of all kinds)

For more facts circle 567 on Reply Card

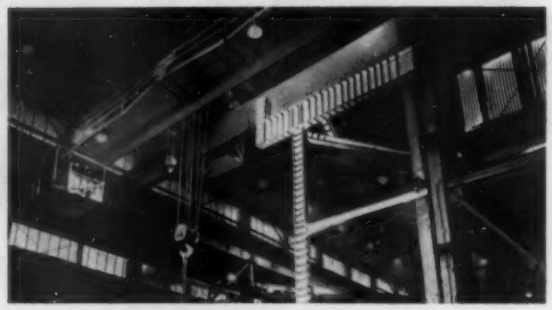
Craneways Extend from One Building Into Another for Flexible Materials Handling

MANUFACTURING huge stamping presses presents a king-size materials handling problem for Danly Machine Specialists, Inc., in its plant in Chicago. Danly operates around the clock, six days a week, turning out mechanical presses for mass-production industries.

Weldments and sub-assemblies weighing many tons are constantly moving between the various fabricating and machining areas of the big plant (actually five connected buildings) and they move according to a tight schedule. To maintain this schedule, Danly operates a materials handling system that is large, yet not unwieldy. Nine Whiting cranes form the backbone of the system.

Eight of the nine cranes are in continuous operation three shifts a day, six days a week: four 50-ton capacity, three 25-ton capacity, and one 15-ton capacity crane. The ninth is a 5-ton capacity model, that "loafs" along, only working two shifts a day on a balcony used for light assembly work.

Whiting cranes are responsible for almost all of the inter-building handling, as press components are moved



through the five buildings of the plant, during various phases of construction. Highly important to this inter-building movement is the extension of two of the crane runways from one building into another, making it possible to transfer lifts from building to building without any intermediate handling.

Open Shelving Goes Higher, Adds Filing Space While Gaining Floor Space

INTRODUCTION OF open adjustable steel shelving at Radio Corporation of America's Engineering Products Division plant in Camden, N. J., has saved 25 per cent in filing equipment cost and gained 30 per cent more floor space.

Installed for filing purchasing department records, the new filing system permits easier identification of sections.

The open shelves filled the need to acquire more floor space for personnel desks and at the same time, to obtain more filing space—both without increasing the total area.

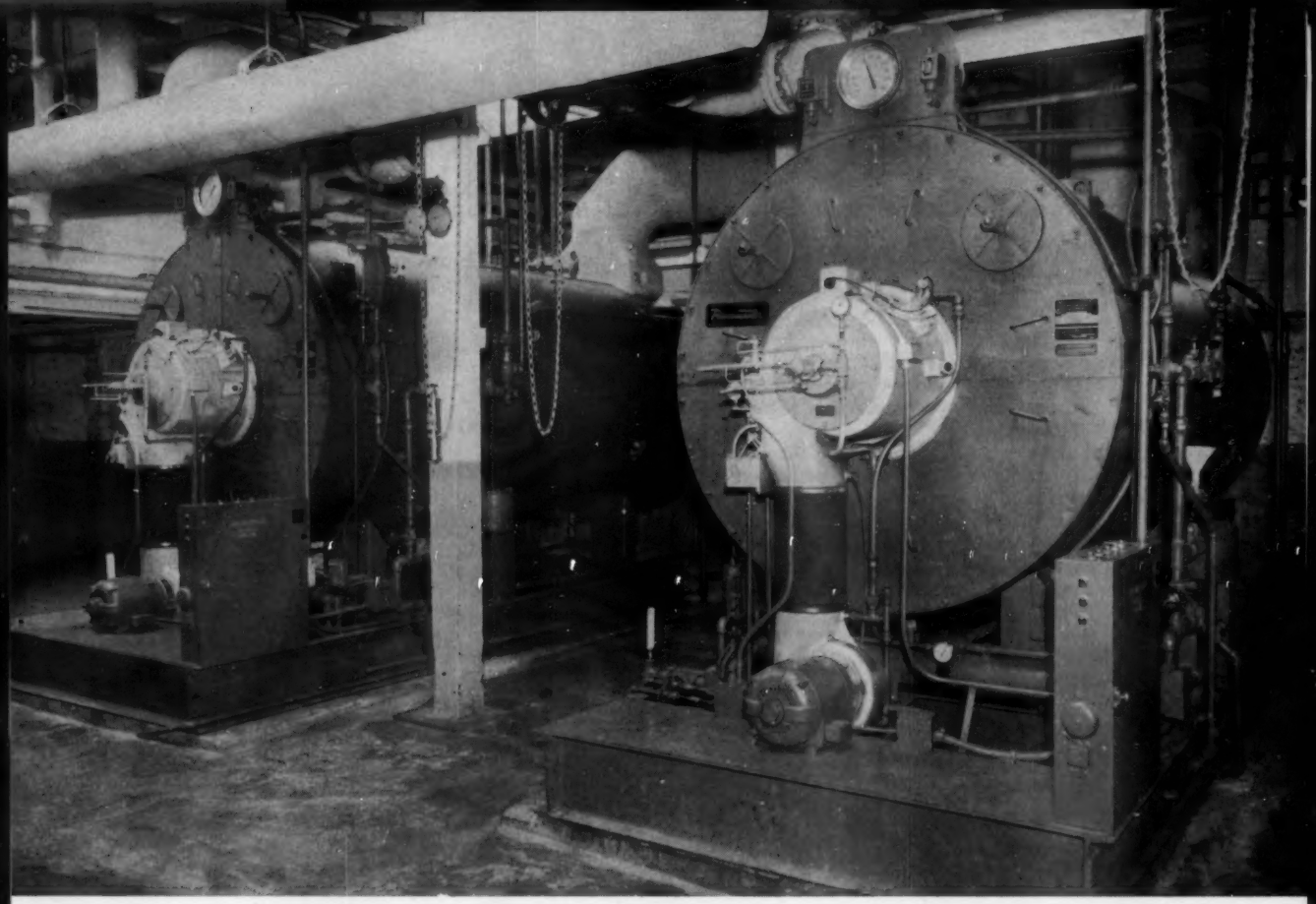
Working with Standard Pressed Steel Co., RCA used Hallowell Adjustable Steel shelving. Shelves, spaced at one foot vertical intervals, are equipped with label holders, as are the ends of every bank of units. Vertical dividers are clipped in at four-inch intervals.

With the job completed, RCA has gained 336 extra square feet of floor space, which was ample to install five additional desks for filing clerks. The shelving provided 256 feet of extra filing space, or the equivalent of 125 file drawers. This extra space is due to the expansion of the files upward, rather than outward. To compensate for the possible unwieldiness of the added height, RCA has placed supplies and seldom-needed files on the top shelves. However, with safety ladders, access to these top shelves is simple and quick, when necessary.

Vinyl Resin Membrane Sprayed on Reservoir Walls to Stop Seepage

EXCESSIVE WATER SEEPAGE through expansion joints of a new 25,000,000 gal reservoir at Omaha, Neb., was stopped by coatings based on Bakelite vinyl resins. Tough, elastic and moisture-resistant membranes formed by the vinyl resin-base coatings expand and shrink with the joints they cover, cutting leakage to a mere trickle. The storage reservoir is nearly two blocks long, one block wide and 35 ft deep at the center. Constructed of reinforced, vibrated concrete on the cantilever principle, the tank lies 80 per cent below grade level and has the roof sodded for a golf course.

To trap an expected hydrostatic leakage of 12 to 15 gallons a minute through the walls and floor, a copper drip basin system was incorporated between the reservoir's double floors. However, leakage at many times that rate resulted when inner surfaces were contracted by incoming water that cooled them as much as 22 F. For solving this problem, coatings based on Bakelite vinyl resins were sprayed over joints inside the reservoir. These coatings formed continuous membrane over the concrete surface, bridging porosity and minor cracks as well as expansion joints. Moisture resistance of the Secoton coating marketed by Surface Engineering Co., Inc., has reduced total leakage to a rate of 1½ to 2 gpm.



$9,040 Saving in Steam Cost

WITH *Powermaster*® PACKAGED AUTOMATIC BOILERS

You get MORE than low-cost steam with Powermasters:

- ★ Low-cost, space-saving installation
- ★ Fast steaming
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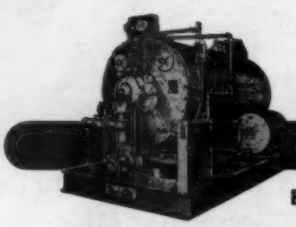
- ★ Quick fuel change-overs
- ★ Clean, dry steam
- ★ Automatic operating and safety contro
- ★ High fuel economy at all loads
- ★ Clean, quiet operation
- ★ Smokeless combustion
- ★ One-source responsibility for complete unit
- ★ Nation-wide factory-trained service organization
- ★ Pay-As-You-SAVE Purchase Plar

These two 200 HP *Powermaster* Packaged Automatic Boilers are saving 50% of steam costs annually for a large manufacturer of clothing. In addition, they are providing hotter, drier steam for processing and comfort heating.

Completely factory assembled and fire-tested *Powermasters* have gained world-wide acceptance as dependable producers of low-cost steam or hot water. And now, you can put a *Powermaster* in your plant or building on the Pay-As-You-SAVE Purchase Plan, that helps you pay for your new boiler out of its own savings.

Write for Bulletin 1220, or ask our representative to explain why it pays to modernize with *Powermaster*.



Powermaster®
PACKAGED AUTOMATIC BOILERS
In sizes to 500 HP; pressures to 250 psi.

ORR & SEMBOWER, INC.
Established 1885 • Morgantown Road, Reading, Pa.

For more facts circle 568 on Reply Card

Glass Block Insulation with Fused Surface Beats Heat and Vapor in Tablet Drying Room

ENGINEERS OF THE Schering Corporation were confronted with unusual problems when they designed a new type of drying system for compounded tablets at the pharmaceutical firm's Union, New Jersey plant.

Departing from the conventional method of drying prescription level pharmaceutical tablets in commercial ovens or furnaces, Schering built an entire room to handle its large volume production. In the room, 18 movable racks hold a total of 694 stainless steel trays containing various tablets. Coating on the tablets are dried and hardened overnight at carefully controlled temperatures.

For interior insulating material that would prevent heat loss from the room and also resist contamination and moisture, the engineers selected Duraface Foamglas, a product of Pittsburgh Corning Corporation. In addition to the insulating properties, this material provided a finished interior wall without the need for plaster or similar surfacing.

Each block of the insulation is made of glass, and the outside face has a durable face fused integrally with the block. In effect, the drying room is glass-lined. Maintenance requirements are negligible, because the surface needs

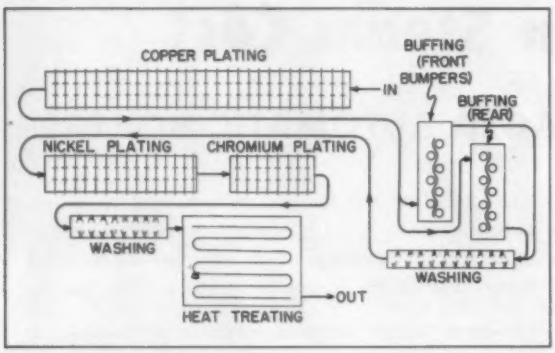
no paint, is washable and cannot peel or crack off. The blocks themselves, composed of glass-enclosed air cells, are vapor-proof.

The room measures 15 ft by 18 ft, and has a ceiling height of 8 ft. Heated air is discharged through a ceiling outlet, louvered to achieve effective, directed air flow.

Oldsmobile Operates Multi-Million Dollar Plating Plant for Bumpers

THE LATEST IN AUTOMATIC plating operations is in operation at Oldsmobile's new multi-million dollar bumper bar plating plant, where the giant copper, nickel and chromium plating machines were made by Hanson-Van Winkle-Munning Co.

To get the production that it wanted, Oldsmobile set up



24 plating cells on the copper line, 10 in the nickel line, and 3 in the chromium. Each machine consists of a pre-cleaning, plating and rinsing action. Plating takes about one hour for copper, 24 min for nickel, 2½ min for chromium.

Bumper bars are automatically loaded onto the plating conveyor, then given various rinses. After immersion in a cyanide copper strike bath and a reclaim rinse, the bars are plated in the cell-type copper plating baths and given a final rinsing.

Racks then pass to the buffing lines, where the bumpers are buffed and washed. Nickel plating follows, in individual cells equipped with conforming anodes. Rinses follow.

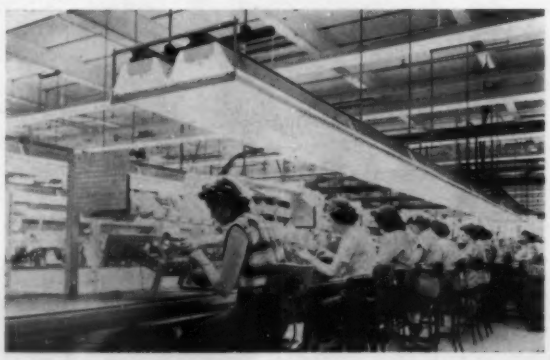
Bars are then reracked for chrome plating. After cleaning, they are immersed in one of three cells located in a 25-ft chromium plating tank. Plated and rinsed, they are automatically unloaded, reracked and stress-relieved at 500F to make the plating ductile and prevent cracking.

Every electrified cell has its own generator. There are 24 10,000-amp, 12v sets for the copper plating, ten 7500-amp 15v sets for nickel, two 15,000 amp, 12v sets for the chrome cells and each cell in the pre-treatment cycle has a set.

Television Production Line Gets Shadowless Lighting from New Luminaire

SPECIAL "SHADOWLESS-LIGHTING" fixtures and techniques designed to reduce plant production costs at the assembly line have been developed and installed at Sylvania's new TV manufacturing plant in Batavia, N. Y. Since reflections of overhead lighting in the bright cadmium-plated television chassis cannot be avoided, the new lighting is designed to spread reflections while minimizing their brightness, and still provide a high level of illumination. Shadows from the workers' hands are eliminated.

The luminaire consists of two continuous rows of dual 90-watt open end industrial units, mounted side by side and shielded by a continuous row of 32 in. square sections of framed white diffusing corrugated vinyl plastic. Corrugations are normal to the lamps for greatest brightness uniformity. Initial brightness is 800 foot-lamberts.



What this change did . . .

Masonry Contractor: A. H. Maxted

Owens-Illinois Glass Block* eliminated the problem of glare, cut maintenance costs, reduced transmission of solar heat

Accurate reading of test results and maintenance of fairly uniform temperatures are necessary in many of the research projects conducted at the Whittier, Calif., Research Laboratory of THE FLUOR CORPORATION, LTD.

That's why ordinary flat glass has been replaced with panels of Owens-Illinois Glass Block. The light-directing and insulating properties of glass block make them a natural solution. Glass block are also virtually maintenance free.

With panels of glass block, daylight is directed upward and diffused over all parts of the rooms all day long. Brightness is kept at comfortable levels, excessive glare and harsh contrasts are eliminated. Owens-Illinois Glass Block insulate so efficiently that it is easier to closely regulate room temperatures.

If you are in the process of remodeling old structures, or building new ones, don't overlook the positive advantages—maintenance economies; better seeing conditions—that panels of Owens-Illinois Glass Block bring. For complete information write Kimble Glass Company, subsidiary of Owens-Illinois, Dept. PE-9, Toledo 1, Ohio.

**Formerly known as INSULUX*

BEFORE
Owens-Illinois Glass Block

AFTER
Owens-Illinois Glass Block

OWENS-ILLINOIS GLASS BLOCK
AN (O) PRODUCT

For more facts circle 569 on Reply Card

OWENS-ILLINOIS
GENERAL OFFICES • TOLEDO 1, OHIO

NEW PLANT CONSTRUCTION — advance information on location, costs

Calhoun County, Ala.—National Gypsum Co., Buffalo, N. Y., wallboard, insulation board and other building materials, has plans for a new branch plant in Calhoun County where large tract of land has been selected. Work will comprise a number of new one- and multi-story structures for the manufacture of paper, approximately 150 tons a day, used to cover wallboard and sheathing. Entire project will represent an investment of several million dollars.

Richmond, Calif.—Standard Oil Co. of California has announced plans for the construction of a 300 ton per day anhydrous ammonia plant at the company's multi-million dollar petrochemical facilities. Most of the entire output will be deployed in the manufacture of complete fertilizers. The plant will represent an investment of several million dollars. M. W. Kellogg Co., Los Angeles, Calif., are engineers.

Santa Barbara, Calif.—Campbell Soup Co., Camden, N. J., food processing firm, will begin work soon on a new mushroom plant, at Gazos Creek. While no details as to size and cost are officially available, company is analyzing plant requirements and labor supply prior to announcement of construction plans. Plant will be a multi-million dollar installation in the range of $15,000,000.

Florence, Colo.—Pabco Products, Inc., Fourth and Brennan Streets, San Francisco, Calif., linoleum, roofing, floor covering and paints, has acquired a large tract of land comprising 46 acres east of Florence and will begin work at once on Colorado's first gypsum wallboard plant, for the production of gypsum wallboard, sheathing lath and plaster. It will be one story and will be equipped for large capacity. Plant will represent an investment of several million dollars and is scheduled to be in production by April 1956.

Chicago, Ill.—Avon Products, Inc., 30 Rockefeller Plaza, New York, N. Y., cosmetics processors, has authorized plans for a new processing plant at Waukegan and Golf Roads in Morton Grove, on a 20 acre tract of land recently acquired for the purpose. Work is to get under way at once and plant will consist of a multi-story unit plus several smaller units, totalling 315,000 sq ft of floor space and will be ready for production about September 1956. Cost reported over $3,000,000. Skidmore, Owings & Merrill are the architects.

Kalamazoo, Mich.—St. Regis Paper Co., kraft wrapping and other papers, bag papers, etc., will carry out an expansion program in local Panelyte Division to increase production of molded and vacuum formed plastics used in the manufacture of refrigerator door panels, carrying cases, wall panels and lamps. A number of new buildings will be added and new machinery installed, for considerable increase in production. Entire project will represent investment of $500,000. Main offices are at 230 Park Avenue, New York, N. Y.

Burlington, N. J.—National Gypsum Co., 325 Delaware Ave., Buffalo, N. Y., fireproof wallboard, insulation board, roofing, siding, etc., has completed plans for a new gypsum wallboard and plaster plant. New one story unit will comprise 100,000 sq ft floor space. Work will begin soon and plant is expected to be in operation by mid 1956. No official estimate of cost announced — reported to be in excess of $1,200,000.

Acme, No. Carolina—Riegel Paper Corp., 262 Madison Ave., New York has announced plans for a major expansion at pulp mill to increase production to about 450 tons of paper pulp per day with the installation of a recovery furnace with a 1,050,000 lb capacity per day along with a 12,500 kva steam turbine for the power plant. Other important additions will be made at an estimated cost of $5,800,000.

Brooklyn, Ohio—Lamson & Sessions Co., Cleveland, O., has authorized plans for the construction of a $4,500,000 plant and office building on local 92 acre site recently acquired. Plant, for the manufacture of bolts, nuts, cotter and cap screws, will comprise a number of new one- and multi-story structures, with installation of heavy equipment and machinery to replace company operations now housed in two Cleveland locations.

Sharonville, Ohio—Ford Motor Co., Cleveland, Ohio, chlorine caustic soda and other heavy chemicals has announced plans for expansion of local cement plant for large, increased output. The project calls for installation of a new cement grinding mill with auxiliary equipment to boost the plant's annual output to 1,900,000 bbl. Work will begin at once at a cost of $1,000,000.

Sharonville, Ohio—Ford Motor Co., Dearborn, Mich., has purchased a 193-acre tract of land for the erection of a plant at Sharonville. Unit will be for the exclusive manufacture and production of automatic transmissions for the Ford line. Details of the plant's size and construction and its use in conjunction with the division's facilities at Fairfax Village, suburb of Cincinnati, will be announced at a later date. Entire project is expected to represent an investment of several million dollars.

Farrell, Pa.—Sharon Steel Corp., Sharon, Pa., has announced plans for the construction of a new mill to produce 100,000 tons of ingots per month. The mill, complete with structures, electrical equipment, soaking pits and other facilities is scheduled for completion by July 1956, at a cost reported in excess of $13,000,000. United Engineering & Foundry Co. are the engineers.

Portland, Ore.—Crown Zellerbach Corp., 343 Sansome Street, San Francisco, Calif., has acquired tract of land comprising 142 acres and will use as site for new green veneer mill. It will comprise a group of one story buildings with an annual capacity of 90,000,000 sq ft of green veneer. Plant will be completely mechanized and is reported to cost $800,000.

Houseville, Pa.—United States Steel Corp., Pittsburgh, Pa., has authorized plans for the erection of iron ore sintering plants and facilities to serve its blast furnaces in the Pittsburgh area. It is estimated that the entire cost of this project will exceed $25,000,000.

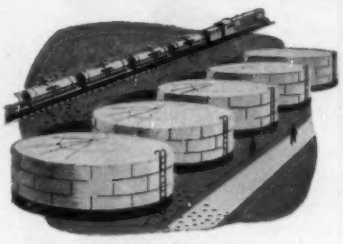
Columbia, Tenn.—International Minerals & Chemical Corp., 20 N. Wacker Dr., Chicago, Ill., has acquired TVA's Godwin Phosphate plant comprising 406 acres of land, railroad siding, along with the plant and all equipment. An expansion and improvement plan has been authorized to rehabilitate the plant. Processing and other machinery will be provided for greatly increased output of 3,000 tons of ore a day. Cost reported to be in excess of $750,000 with work to begin at once.

Nashville, Tenn.—Ferro Corp., Cleveland, Ohio, has authorized plans for the expansion of its glass fiber division at Nashville, Tenn. Expansion and new equipment will double the plant's capacity at a reported cost of $1,500,000.

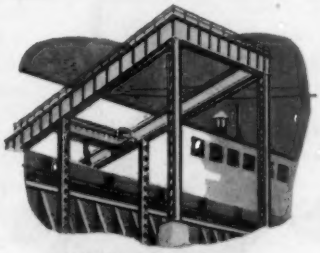
Dallas, Texas—American Can Co., 100 Park Ave., New York, N. Y., metal and fibre cans and containers, has plans maturing for new plant at Arlington on a 12-acre site acquired for that purpose. New plant unit at Abraham and Watson Roads, will comprise a main one story structure with several smaller units and will be equipped for large capacity. Estimated output will be 300,000,000 cans per year. No official estimate of cost announced — estimated over $1,000,000.

Houston, Texas—Texas Butadiene and Chemical Corp., Esperson Building, Houston, Texas, acids and alum and bone products, has authorized plans for the erection of a dual purpose plant to produce butadiene and alkylate-aviation gasoline. The plant will have an annual production capacity of 2,500,000 bbl of avgas with 17,000 tons of butadiene. Entire project reported to cost $26,000,000 and to be in production late in 1956.

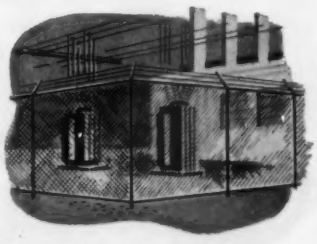
Here are 6 Trouble Spots where PITT CHEM® can Stop Corrosion!



TANKS

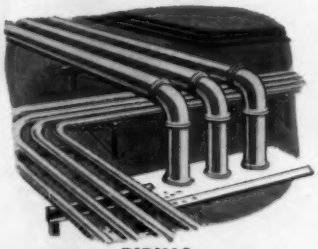


STRUCTURAL STEEL

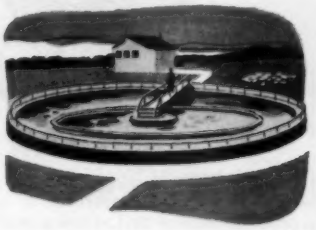


STEEL FENCES

PROCESSING EQUIPMENT



PIPING



WASTE DISPOSAL

WHAT are *you* doing to stop costly corrosion in trouble spots like these? Using ordinary paints? They probably won't do, because most industrial corrosion has an insatiable appetite for thin, conventional paints. It takes a thick, tough, heavy duty protective coating to *really* halt corrosion's march on your plant and equipment investment.

Pitt Chem Tar Base Coatings fill the bill in every particular. They're so resistant to moisture, alkalis, mineral acids and weather that they'll outlast a dozen applications of ordinary paint. Yet they cost no more per gallon and they're easy to apply.

Look at it this way: *No other material does such a complete job of protection at so little cost.* And we've got the facts to prove it. If you want to stop corrosion in your plant, we'll be glad to show you the most economical and effective way to do it. Write for complete details today.

W&D 5522

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

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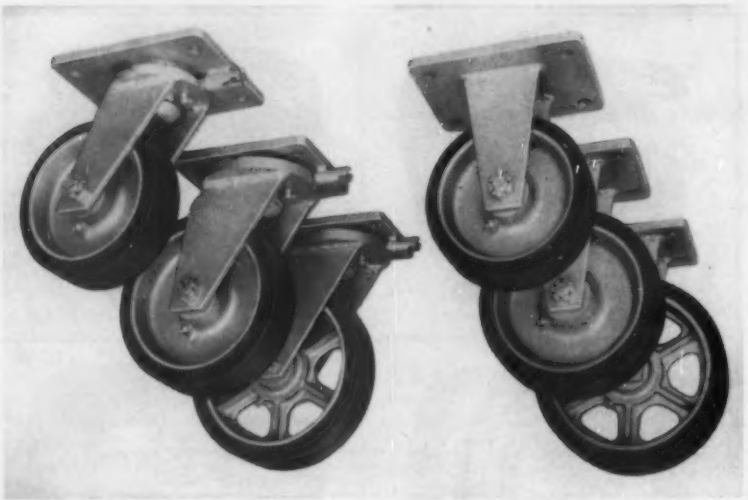
MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

New Bassick "MilSpec" Casters meet military specifications

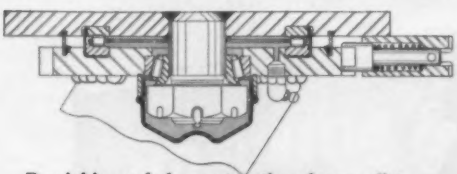


Bassick's new "MilSpec" line is specifically designed and engineered to meet the requirements of MIL-4749 and MIL-C-4750 for precision swivel and wheel bearings, sealed bearings, adjustable swivel bearings.

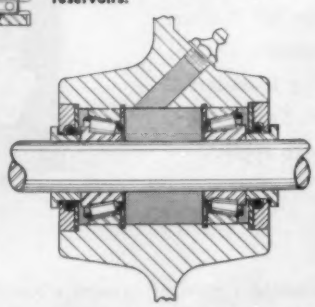
The new line includes 8, 10 and 12 in. heavy-duty, swivel and rigid casters for both inside and outside service on either hand- or power-pulled materials-handling equipment.

The swivel bearings are self-contained, precision units of the highest quality. Wheel bearings are the finest tapered type. Threaded king bolt and slotted nut construction make fine adjustment of swivel bearing possible.

"MilSpec" sealed swivel and wheel bearing assembly



Gray areas show lubrication reservoirs.



Bassick's sealed construction keeps dirt, water and foreign matter out of both wheel (right) and swivel bearing (above) assemblies of "MilSpec" casters. Protective lubricant stays in to prolong life and insure easy action. Alemite pressure-type grease fittings permit flushing and re-greasing with standard grease guns.

MilSpec "Floating-Hub" Caster gives safe ride

Important in the new "MilSpec" line is Bassick's famous "Floating-Hub" caster.

Smothers shocks

It combines the shock absorption of "Floating-Hub's" sprung-wheel construction with the precision quality of "MilSpec" casters. MilSpec "Floating-Hubs" give any load a safe ride — should be first choice in handling any equipment subject to damage in moving.

Tops on rough terrain

They're also better suited for higher speeds and rougher terrains than ordinary casters. And with adjustable precision sealed bearings, MilSpec "Floating-Hubs" will stay on the job long after lesser casters call it quits.

Write for information

Write to Bassick for printed data on the new "MilSpec" casters. Remember — an original investment in quality casters pays off in added years of trouble-free, money-saving performance. Specify Bassick casters and you'll be sure you have the best.

There is an authorized distributor of Bassick casters conveniently located to give you service. He's always a good source of information about new product developments.

THE BASSICK COMPANY
Bridgeport 2, Conn.
In Canada:
Belleville, Ont.

Bassick
A DIVISION OF
STEWART SW WARNER

MAKING MORE KINDS OF CASTERS... MAKING CASTERS DO MORE

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there's over a century of know-how behind every WICKWIRE WIRE ROPE SLING

Wickwire Wire Rope Slings are manufactured by a company whose history goes back well over a century... a company that takes great pride in its heritage and prestige... a company ready to stand behind *every* wire rope sling it sells.

All the knowledge and experience gained over the years in the manufacture of Wickwire Rope has been incorporated into the fabrication of Wickwire Wire Rope Slings. You are assured of materials of the highest quality. And in using wire rope slings, there can be no compromise with quality. Too much is at stake—the safety of the handling crew, possible damage to costly materials, and loss of productive time.

When you specify Wickwire Wire Rope Slings you get product responsibility that assures safe, efficient and economical service. Wickwire Slings are made from wire rope and fittings with matched rated capacities.

SEND FOR YOUR WICKWIRE SLING CATALOG TODAY

Just write us on your company stationery and we'll rush your copy to you—*free of charge and postpaid.* Our 120-page manual gives complete up-to-the-minute data, with hundreds of explanatory illustrations. It has a tough permanent cover, is fully indexed and handy to use. You'll find it indispensable for quick reference and helpful information when specifying the Wickwire Sling you need for the best in sling service.

2962

CF&I

WICKWIRE
WIRE ROPE SLINGS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

THE COLORADO FUEL AND IRON CORPORATION—Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane.
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • New Orleans • New York • Philadelphia.

For more facts circle 573 on Reply Card

how many uses for DEXION in your plant?

RACK

DINING TABLES

STORAGE

DIE RACKS

TABLE AND BINS

FILING TABLE

Easy to cut. One stroke of DEXION cutter saves time.

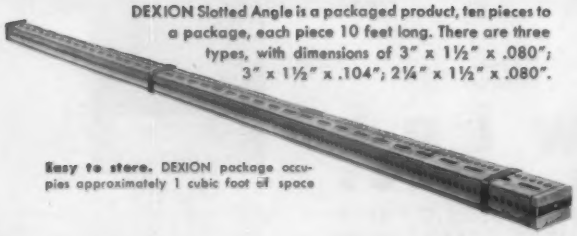
Simple to connect. Use only two wrenches.

DEXION panels. For shelving to support heavy loads.

Re-usable. Dismantle—rebuild into other equipment.

Here's why you'll want DEXION Slotted Angle over any other framing material

Only your imagination limits the applications of this ingenious slotted angle framing material. Users discover that they can build whatever they need—when they need it—and build it cheaper! Easily dismantled, DEXION Slotted Angle can be *reused* in new ways to meet changing needs. There's no waste! And anyone who can use a wrench and a saw (or DEXION cutter) can build with this precision-made slotted angle.



DEXION Slotted Angle is a packaged product, ten pieces to a package, each piece 10 feet long. There are three types, with dimensions of 3" x 1½" x .080"; 3" x 1½" x .104"; 2¼" x 1½" x .080".

Easy to store. DEXION package occupies approximately 1 cubic foot of space

GET the exciting new
DEXION IDEA BROCHURE,
which gives you full information. Write direct to the address shown below, Dept. 9C.

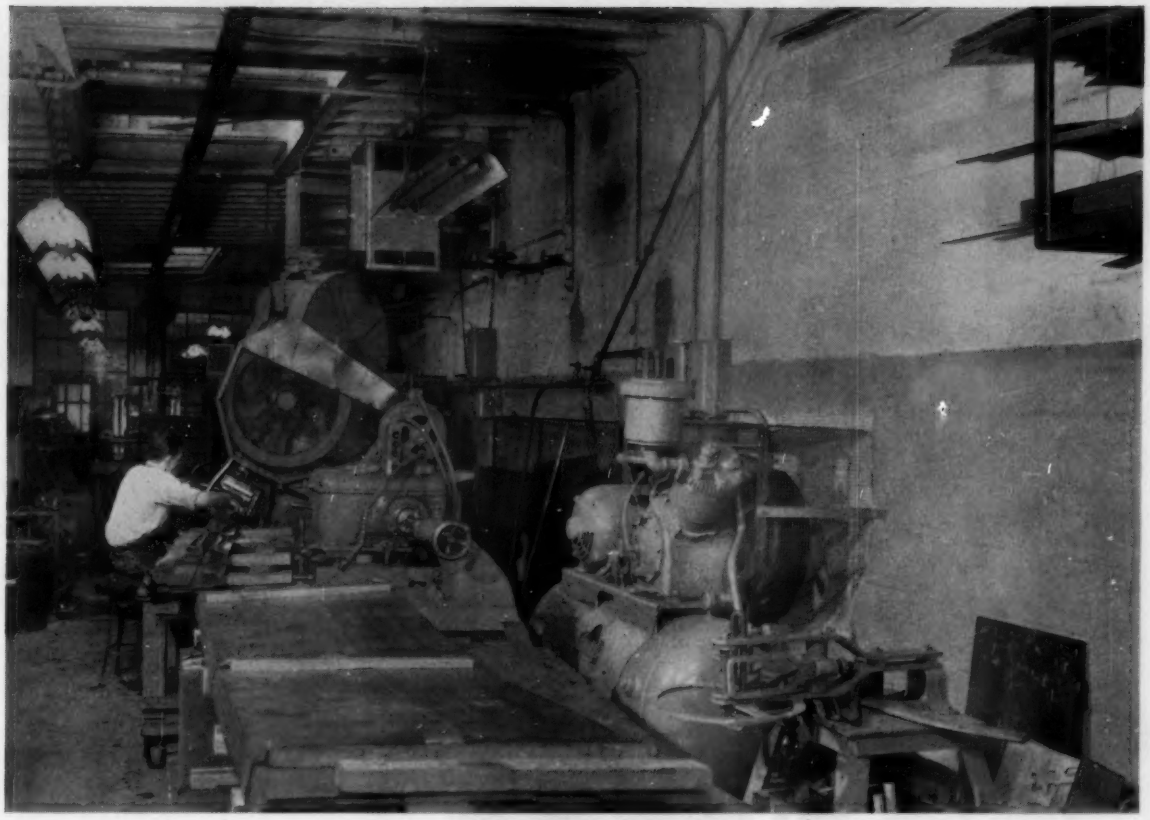
DEXION DIVISION

ACME STEEL COMPANY

2840 ARCHER AVENUE, CHICAGO 8, ILLINOIS

ACME STEEL

For more facts circle 574 on Reply Card



Punching Out Extra Profits

Dependable Westinghouse Air Compressor supplies versatile, economical air power to raise production and lower costs

That's just what the operator of this punch press is doing — punching out the extra profits that result from increased production.

And it's a Westinghouse Air Compressor that's responsible for his greater output.

Why? Because Westinghouse Air Compressors have 15 features not found in any other compressor — features that mean greater dependability and greater efficiency for low-cost operation. Here they are:

Type M inlet filter, disc valves, enclosed crankcase, anti-friction main bearings, pressure lubrication, low oil level protection, enclosed starting unloader, adequate cooling fins, "Y" type construction, high velocity fly-wheel fan, large size intercooler, thermal overload protection, greater weight, dual control, and one-year warranty period.

Let compressed air help you punch out those extra profits with its versatility. And guarantee yourself a trouble-free source of supply by using Westinghouse Air Compressors. Sizes up to 40 hp — write for latest literature.

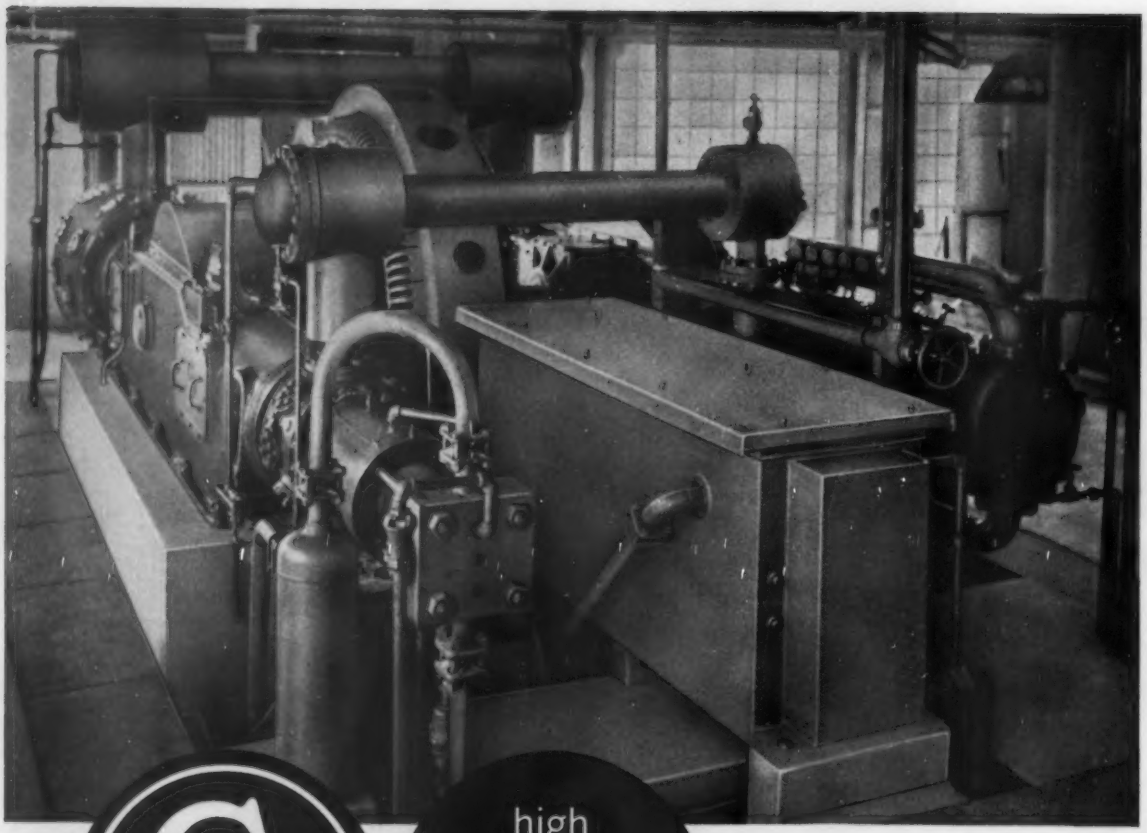
W-102

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 14, Wisconsin

PORTABLE AIR COMPRESSORS · TRACTAIR · STATIONARY AIR COMPRESSORS · AIR TOOLS · ENGINES

For more facts circle 575 on Reply Card



high pressure compressors

A typical CP high pressure compressor installation is this horizontal, four-corner, five-stage compressor delivering gas at 3,000 psig. Intercoolers, with extra-large separators, are machine-mounted, simplifying piping layout. Low compression ratio per stage, low rotative speed and roller bearings assure low power consumption and minimum maintenance expense.

...built to deliver up to 15,000 psig

There's a CP Compressor suited to your special requirements for pressures up to 15,000 psig. They're available in vertical or horizontal, stationary, portable, or semi-portable package types . . . liquid or air cooled . . . manual or automatic capacity control with fixed or variable volume clearance pockets . . . electric motor or steam driven. For information write *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR AND GAS COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS

For more facts circle 576 on Reply Card

For more facts circle 577 on Reply Card——→

ACCO products

WRIGHT Electric Hoists for Top Production, Easiest Maintenance

WRIGHT *Speedway* Electric Hoists—Frame 1, Frame 2 and Frame 3—are ideal **HOISTS** for handling production materials where the load requirements **ARE** from ¼ ton to 10 ton capacity. Their design includes many advanced **SAFE** operating features. Sound choice of components provides them with **EFFICIENT** balance for smooth running. Parts are designed and built to give **RUGGED** performance with a minimum of care. Plant operating men find them **ADAPTABLE** to almost every type of shop work because of the wide range of speeds, lifts and mountings.

The more particular you are in your selection of hoisting equipment—the more likely you are to choose WRIGHT

Write our York, Pa., office for any or all of these fully informative bulletins—

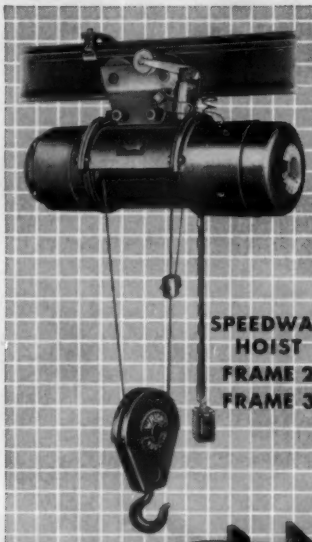
Bulletin DH-133B on Frame 1 and 1½ WRIGHT Speedways
Catalog E-54A on Frame 2 and 3 WRIGHT Speedways
Bulletin DH-504 on WRIGHT Electric Roller Chain Hoist

ACCO

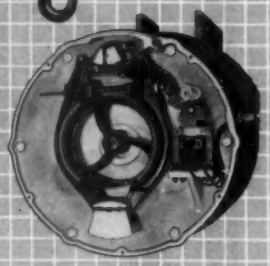
Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

for Better Value



SPEEDWAY HOIST FRAME 2 FRAME 3



MOTOR BRAKE & SOLENOID FRAME 2 and FRAME 3 HOIST
"Nothing to adjust but the cam!"

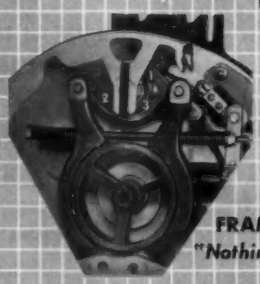
WRIGHT
Electric Roller Chain Hoist

- ¼, ½, 1 and 2-ton capacities
- Fewest number of wearing parts
- Self-locking, double-worm gear acts as own load brake
- Spring-set, shoe-type motor brake, clam shell type
- Oversize precision ball bearings
- Forged steel-alloy hook, swings and swivels

COMPETITIVELY PRICED

SPEEDWAY HOIST FRAME 1 (also FRAME 1½)

THIS DOUBLE-WORM GEAR ELIMINATES TROUBLESOME LOAD BRAKES



MOTOR BRAKE FRAME 1 and FRAME 1½
"Nothing to adjust but the cam!"

Aquadam

asbestos smooth-surfaced Built-Up Roofs

for deck inclines from dead level to ½" per foot

The new Johns-Manville Aquadam asbestos smooth-surfaced built-up roof has been especially designed to give the best possible protection to a building and its contents.

The Aquadam Asbestos Smooth-Surfaced Roof Specification, like the recently announced J-M Aquadam Slag-Surfaced Specification, owes its superiority to Aquadam—a bituminous asphalt cementing agent developed exclusively by Johns-Manville and employed in the application of the roofing felts.

J-M Aquadam provides these important advantages

- greater weather resistance
- greater resistance to cracking
- improved self-healing properties
- greater kettle stability
- greater adhesion
- stronger bond
- greater resistance to water
- excellent uniformity

In the Aquadam Asbestos Smooth-Surfaced Roof Specification all the qualities of Aquadam are combined with the time-proven advantages of asbestos felts in smooth-surfaced built-up roof construction.

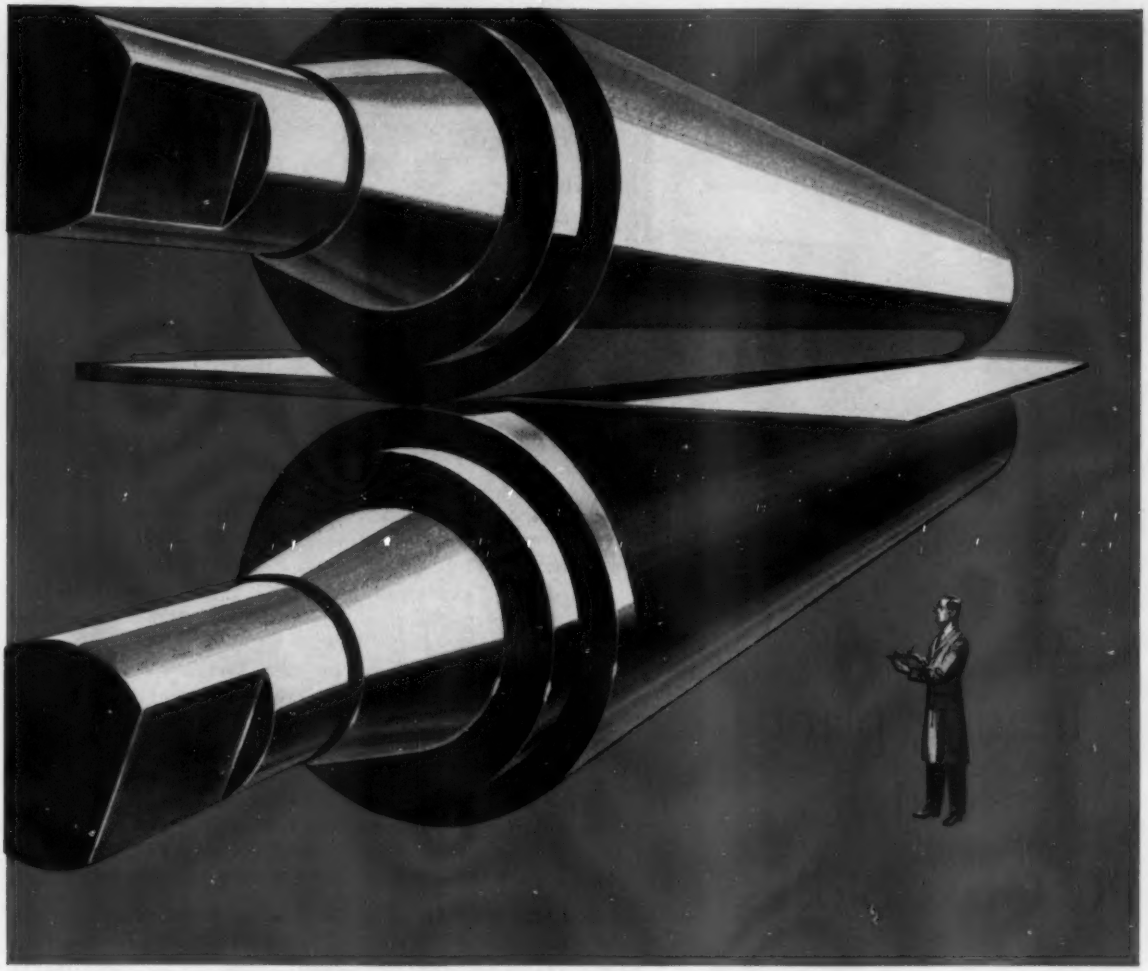
For complete information about Aquadam Built-Up Roofs, see your Approved Johns-Manville Contractor. He's listed in the classified telephone directory. Or write Johns-Manville, Box 158, New York 16, N.Y. In Canada, 565 Lakeshore Rd. East, Port Credit, Ont.

See "Meet the Press" on NBC-TV, sponsored on alternate Sundays by Johns-Manville

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

For more facts circle 578 on Reply Card



THE MAN WITH EXPERIENCE IN INDUSTRIAL LUBRICATION

Here's a man with experience, where experience counts, on-the-job experience in heavy industrial lubrication.

He's a man who is typical of Atlantic service. Selected to represent Atlantic because he *is* a specialist. And he's backed by other Atlantic specialists in lubrication research, production, quality control and transportation.

Atlantic has served customers successfully for 85 years because Atlantic has developed the products necessary to do the lubrication job right at the lowest cost to the lubricant consumer.

Why not benefit by this combination of correct lubricants and technical service? Simply write, wire or phone the Atlantic office nearest you for full information on Atlantic lubricants. The Atlantic Refining Company, Dept. M-9, 260 South Broad Street, Philadelphia 1, Pa.

PROVIDENCE, R. I.
430 Hospital Trust Building

SYRACUSE, N. Y.
Salina and Genesee Sts.

READING, PA.
First and Penn Aves.

PITTSBURGH, PA.
Chamber of Commerce Building

ATLANTIC

LUBRICANTS • WAXES
PROCESS PRODUCTS

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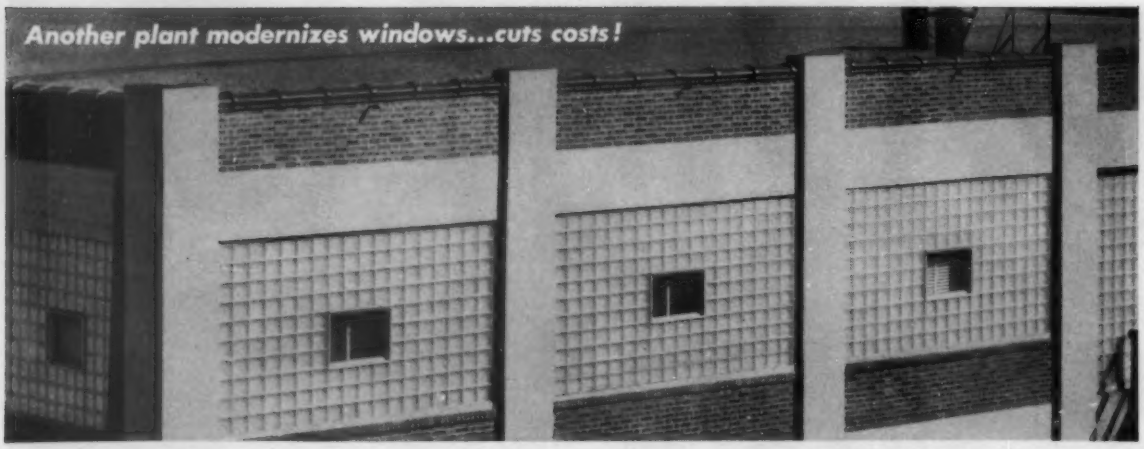
Another plant modernizes windows...cuts costs!



"We saved the cost of a new heating plant with PC Glass Blocks,"

says **E. W. Meyers, Jr.,**
President, Trion, Inc.,
Pittsburgh, Pa.

Trion, Inc. is a world-famous manufacturer of electronic air cleaning equipment, so naturally they didn't want dirt seeping into their plant.

The old steel sash let in dirt. And, it leaked so much air that the heating plant was inadequate. Trion licked both of these problems and got a better looking building to boot when they eliminated the steel sash and installed PC Glass Blocks.

Mr. Meyers says, "We not only saved the cost of a new heating plant, but we reduced our heating bill as well. The PC Glass Blocks have eliminated dirt infiltration, and our building looks better than ever before."

In summary: PC Glass Blocks will improve the appearance of your building, give much better daylighting, and reduce dirt. They also cut heating and cooling bills because a PC Glass Block panel has the insulating efficiency of an 8-inch masonry wall.

NEW FREE BOOKLET "How To Modernize Old Windows" tells the complete story. Write to Pittsburgh Corning Corporation, Dept. PG-15, One Gateway Center, Pittsburgh 22, Pennsylvania.

PC Glass Blocks

® PITTSBURGH PC CORNING

ALSO SKYTROL® AND FOAMGLAS®

For more facts circle 580 on Reply Card

"Doc, dermatitis control is simple as 1-2-3-4-5."

An exaggeration?

Not at all. Occupational skin irritation can be prevented. Simply. Inexpensively.

—with the WEST Dermatitis Prevention and Control Program that:
1—insures personal cleanliness
2—protects exposed skin areas
3—prevents clothing contamination
4—guards against special hazards
5—provides continuous consultation.

WORKERS free of skin irritation can save you hundreds, perhaps thousands, of dollars each year—by eliminating the cost of:
—medical treatment
—enforced idleness
—absenteeism
—sacrificed quality
—lowered morale
—production lags.

THE WEST Program for controlling skin irritations is based on individual shop requirements and an in-your-shop survey, made without obligation. Let a WEST representative plan the details. Or send for our 24 page booklet on the "Control of Industrial Dermatitis."

OLDEST AND LARGEST COMPANY OF ITS KIND IN THE WORLD

WEST DISINFECTING Company

WEST DISINFECTING COMPANY Dept. 52
42-16 West Street, Long Island City 1, N. Y. (Branches in principal cities)
In Canada: 5621-23 Casgrain Ave., Montreal

☐ I'd like a free copy of your 24 page booklet on dermatitis.
☐ I'd like to have a WEST representative telephone me for an appointment.

Name_____

Position_____

(Tear out this coupon and mail it with your letterhead)

For more facts circle 581 on Reply Card

FACTS ABOUT Exide®

IRONCLAD® INDUSTRIAL TRUCK BATTERIES

WORLD'S LARGEST UNDERGROUND "REFRIGERATOR" STORES MORE FOOD FASTER... SAFER WITH EXIDES!

IN AREAS REFRIGERATED TO SUB-ZERO TEMPERATURES A RAPID AND UNIFORM RATE OF MOVING FOODSTUFFS FROM LOADING PLATFORMS TO STORAGE CHAMBERS IS ASSURED BY EXIDE-POWERED ELECTRIC TRUCKS AT NATURAL STORAGE COMPANY IN BONNER SPRINGS, KANSAS. EXIDE-IRONCLADS WORK DEPENDABLY UNDER SEVERE OPERATING CONDITIONS—PROVIDE POWER WITHOUT CONTAMINATING FUMES OR NOISE. EXIDE-IRONCLADS PROVIDE THE SAFEST, FASTEST, LOWEST COST METHOD OF MOVING - STACKING - STORING MATERIALS. EXIDES ARE ALWAYS—

YOUR BEST MOTIVE POWER BUY—*AT ANY PRICE!*

MOVE TEN TONS FOR A PENNY!

...WITH DEPENDABLE EXIDE-IRONCLAD POWER

THIRTY-SEVEN CENTS A DAY BUYS THE POWER TO KEEP AN ELECTRIC TRUCK ON THE JOB ALL SHIFT LONG—MOVING 340 TONS! COMPARE THIS LOW OPERATING COST WITH THAT FOR ANY OTHER TYPE OF POWER. YES, EXIDE DEPENDABILITY AND EXCEPTIONALLY LONG USEFUL LIFE RESULTS IN LOWEST HANDLING COSTS PER TON!

TUBES OF POWER WORK FOR YOU INSIDE AN IRONCLAD

FINELY SLOTTED TUBES INSIDE AN IRONCLAD KEEP THE ACTIVE MATERIAL IN FIRM CONTACT WITH THE CONDUCTING GRIDS OF THE POSITIVE PLATE. THUS, THE GRID IS PROTECTED...THE ACTIVE MATERIAL IS KEPT IN CONTACT WITH THE GRID LONGER... *THE BATTERY'S WORK LIFE IS LENGTHENED.* THE SLOTTED TUBES ALSO EXPOSE MORE ACTIVE MATERIAL TO THE ELECTROLYTE... *FOR GREATER POWER!* RESULT: THE IRONCLAD'S ABILITY TO DO A DEPENDABLE JOB FOR A LONGER PERIOD OF TIME.

LET EXIDE HELP SOLVE YOUR INDUSTRIAL TRUCK BATTERY PROBLEMS. ❶ CALL AN EXIDE SALES ENGINEER FOR FULL DETAILS. ❷ WRITE FOR FORM 1982, A MANUAL ON INSTALLING AND MAINTAINING MOTIVE POWER BATTERIES.

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.

For more facts circle 582 on Reply Card

TAPE that sticks on both sides

Simply whisk off the protective liner from unique "SCOTCH" Brand Double-Coated Tape and you expose a second adhesive surface. Now you've got *two* sides of the strongest adhesive on any pressure-sensitive tape. "SCOTCH" Brand Double-Coated Tapes come in both transparent and opaque types. Ask your "SCOTCH" Brand Tape distributor about "Double-Coateds"; or, write us direct.

DOUBLE-COATED TAPE

... one of more than

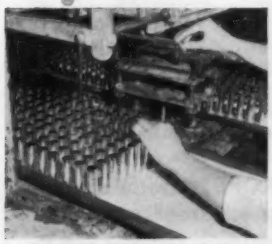
300 Pressure-Sensitive Tapes

for industry trademarked...

*Reg. U.S. Pat. Off.

SCOTCH
BRAND

Look what you can do with it!



GET A STICKY SURFACE: Strips of "SCOTCH" Brand Double-Coated Tape on bottom of filling-line tray firmly hold freshly painted cosmetic vials; keep them from tipping and smearing.

BOND METAL TO WOOD: "SCOTCH" Double-Coated Tape is used in printing to hold metal engravings to wood or metal bases. Tape holds tight at press speeds; just 25 seconds to mount!

FASTEN FABRIC: A "SCOTCH" Brand Double-Coated Tape can hold fabric coverings to wood or metal; keep decorative materials in place. Tape is quick and easy to apply; clean; never messy.

FREE FOLDER shows many additional ways "SCOTCH" Brand Double-Coated Tapes can save time and money and solve production problems. Write on your letterhead to Dept. FB-95.

The term "SCOTCH" is a registered trademark of Minnesota Mining and Mfg. Co., St. Paul 6, Minn. Export Sales Office: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

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For more facts circle 583 on Reply Card

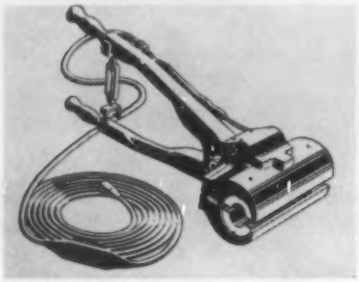
NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

Use the Reader Service Cards provided on pages 215-216 to ask for more information on these products. Circle item numbers of products in which you are interested.

1—CABLE VULCANIZER for on-the-job repairs

Reported to weigh only 16 lb, less molds, this electrically operated cable vulcanizer is designed to handle repairs on cable up through 2 in. in diam. The portable unit is available for use on standard a-c and d-c voltages with a wattage rating of



1000. It is designed for quick "on the job" jacket repairs or to replace insulation and jacketing when splices are required. Its jaws permit vulcanization throughout its entire 8-in. core length, making closely spaced splices possible The vulcanizer is thermostatically controlled and fast acting, it is pointed out, and aluminum molds for use with it have been developed to cover many standard and special types of cable. Bulletin B48a gives full details. Joy Mfg. Co.

2—CONVEYOR BELT for the steep inclines

This cleated conveyor belt is designed to carry loads up grades of 30 per cent or more, where flat-topped belts would allow slippage. The belting is available in a range of plies, cover thicknesses, widths and rubber compounds. The cleats, made of rubber, can be had in heights of ⅜ in., ½ in., 1 in., and 1½ in. Goodyear Tire & Rubber Co.

3—METERING PUMP is solenoid-clutch operated

For metering to a flow, UMC Pump is a positive displacement unit actuated by a solenoid operated single revolution clutch. This arrangement permits one stroke of the pump plunger in response to an electric signal which may be timed to effect a feed rate to the main flow line at regularly timed intervals, it is explained. Electrical impulses can originate from a mechanical flow meter, differential meter, gravimetric meter, etc.

Though designed primarily for metering and proportioning of additives and odorants to fuel and natural gas lines, this pump is also suggested for the addition of boiler feed compounds and use in chemical and food processing. Its outstanding features are announced as low unit and operating cost, positive operation and immediate availability. The UMC Pump comes in maximum capacities from 0.10 gph to 20 gph per feed. Single feed is standard, but two-feed units are available. Hills-McCanna Co.

4—CONDUIT RACKS for holding material vertically

Storage of large quantities of electrical conduit and other piping material is possible in less space with these vertical conduit racks. Lengths of conduit up to 10 ft can be stored upright, says manufacturer, and withdrawing of materials is made easier by the vertical position. The racks are individual units, require neither fastening to floor nor bracing to walls or ceiling. Being anchored by their own weight, they become more stable as the load is increased, it is noted. Each rack provides 9 sq ft of conduit storage space. The racks may be placed singly, in rows or back to back. To expedite shipping and receiving of conduit, racks may be bolted to a pallet and transported by industrial truck. Made of steel, the racks are 36 in. wide, 48 in. deep and 8 ft high. The Frick-Gallagher Mfg. Co.

5—SHIPPING CONTAINER is lightweight, durable

The all-metal Band-Box consists of a compact combination steel pallet, container sides and top, which is fully nestable in its component parts, light in weight, strong and durable. Its cover promotes cleanliness and protects contents during shipment and storage. Tierable, due to its design and stamping, it is in reality a four-way pallet and shipping box combination that can be utilized efficiently and inexpensively for inter-plant and/or intra-plant purposes. It is easily set up in minutes, says company, and can be knocked down and nested for efficient storage and transshipment. All parts of a given size are interchangeable and damaged parts can be replaced. The Band-Box is made in three standard sizes weighing 85, 99.5, and 122 lb each, and can be furnished in other sizes. Ackermann Mfg. Co.

6—AIR DIFFUSER for draftless air conditioning

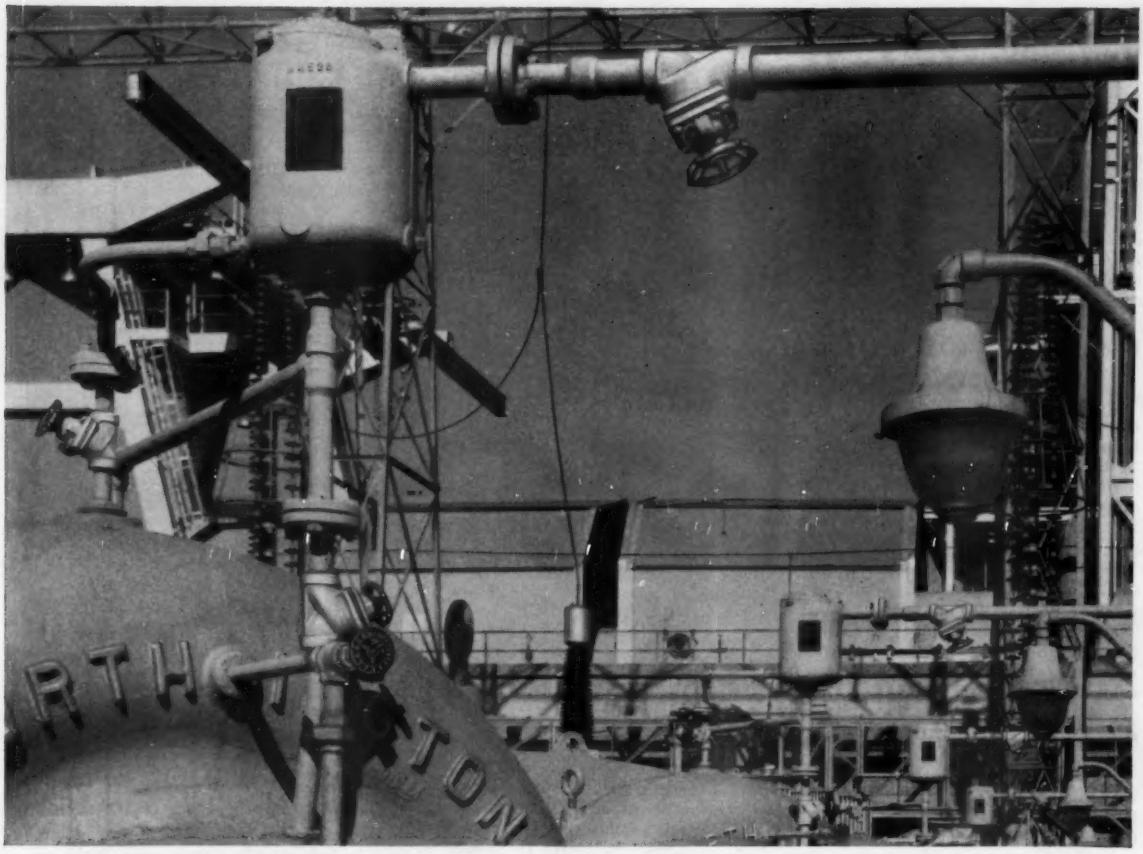
Modular Multi-Vent has been developed as a competitively-priced version of company's Multi-Vent air diffusing principle for providing draftless air conditioning and uniform temperature control. Its advantages are not restricted to air cooling, says company; they apply equally well to heating and ventilating systems. Modular Multi-Vent employs a perforated ceiling panel to introduce air vertically, and at low velocity, into a room

or working area. These perforations reduce the high velocity of air in the duct from 100 to 1500 fpm to 40 or 50 fpm as it leaves the panel, it is explained, just as the perforated head of a sprinkling hand delivers the same amount of water as a direct spout, but in a gentle and more widespread flow.

This air diffuser can be concealed from view, it is pointed out; it doesn't interfere with light fixtures and it permits walls, shelves and partitions to be moved freely. Also, dirt marks and smudges are claimed to be eliminated because air leaving the diffuser moves vertically, away from the ceiling. The panels may be had for metal pan, plaster and acoustic tile ceilings, as well as for exposed duct applications. The units run in price from $5.75 up. Pyle-National Co.

7—WIRE ROPE is made of plastic coated steel

Plasteel — a plastic coated cable — is announced as available in sizes 1/16 by ⅛ in. to ¼ by ⅜ in. inclusive, in transparent green, or opaque white. Strengths are from 480 lb to 7000 lb. Plasteel is either a preformed galvanized steel or stainless steel wire rope, coated with strong, flexible plastic. Thickness of plastic coating varies with diameter of rope. Flexibility



Corrosive circulating water tamed here by these CRANE VALVES

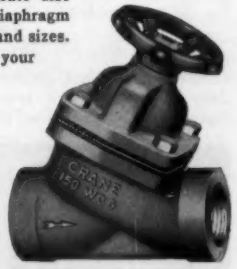
THE CASE HISTORY—Almost 2 years' operation without any maintenance of valves on circulating water lines to condensers, and on priming and instrumentation systems—with no trouble in sight. That's the experience of Southern California Edison Company's 280,000 k.w. steam station at Etiwanda with Crane Packless Diaphragm Valves.

The plant's engineers knew that sediment in recirculated water would quickly cut out the seats in ordinary valves and its corrosive elements would attack working parts to make valve operation difficult.

Not so with Crane Packless Diaphragm Valves. Their sealed bonnet keeps working parts out of contact with line fluid—free of corrosive effects. Separate disc construction with pliable insert resists erosion—seats tightly even on foreign particles. Large or small, these valves operate easily with fewer turns to the cycle. Typical Crane quality throughout—they're made better to do the job better—a bigger value for the thrifty buyer.

CRANE No. 1610 PACKLESS DIAPHRAGM VALVES

No packing to maintain. Neoprene diaphragm has longer life because it seals the bonnet only—is not subject to the cutting and crushing encountered when also required to do the seating. Separate disc gives control of fluid even should diaphragm fail. Wide selection of materials and sizes. Write for folder AD-1942 or see your Crane Representative.



CRANE CO.

General Offices: 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • KITCHENS • PLUMBING • HEATING

CRANE'S FIRST CENTURY . . . 1855-1955

For more facts circle 585 on Reply Card

NEW PRODUCTS

(Begins on page 148)

of rope is not adversely affected by plastic coating, it is said; it resists sunlight, oxidation, and provides excellent color stability, as well as being resistant to most acids, bases, salts, oils and greases, except hydro-fluoric acid and methyl ethyl ketone. Size description includes diameter before and after coating. Circular 5540 gives data. Macwhyte Co.

8—FIRE DETECTOR gives out with shrill warning

The Falcon Automatic Fire Detector consists of a steel cylinder containing a harmless Freon gas sealed in with a fusible metal plug and a horn. At 136 F the fusible link melts and the gas escapes through the horn to produce a piercing sound rated at 100 decibels. Company says you can hear it 500 ft away. The industrial size of this device gives a 12 to 18 min warning of fire, and there's also a smaller size for home use. The detector is announced as UL approved, with one unit rated as adequate warning coverage for approximately 400 sq ft. Fyr-Larm Co., Inc.

9—SET SCREWS fit well and hold tighter

According to manufacturer, this new line of socket-head set screws can be tightened up to 40 per cent tighter and hence have greater holding power than most set screws. Called high-torque set screws, the new steel fasteners come in sizes from No. 0 to 1-in. diam. Advantages claimed for the screws include much greater holding power, better and more uniform fit, and greater re-use and wear life. Standard Pressed Steel Co.

10—FILING UNIT will store templates, gaskets, tools

Templa-File, for filing and storing templates, patterns, gaskets, and flat tools, contains 24 36-by-80 in. numbered sliding panels—each suspended on rollers operating on roll-formed track. The capacity (storage area) of unit is 2,880 sq ft. Each panel will independently support 600 lb of suspended weight. The unit occupies less than 25 sq ft of floor area. An unusual feature is a self-contained record or reference desk which folds back into unit when not in use. Attached to desk is a swing-out tabulating card. Templa-File may also be used to store visual plant layouts, wiring diagrams or blueprints. Dimensions of this unit are 9½ ft wide, 31 in. deep, 7 ft high, and net weight is 1,500 lb. The finish is grey enamel. DeLuxe Metal Furniture Co.

11—SANDING TOOL puts smooth finish on surfaces

Using standard 5-in. abrasive discs, the Kwik-Sand Roto-5 is claimed to give a professional finish to wood, metal, and plastics, at savings in time and money

and with safety to the operator. Manufacturer says it takes only seconds to change from a coarse to a fine grit abrasive, or vice-versa, for sanding, to apply a special abrasive for tool sharpening, or to attach a lambswool bonnet to buffing. A safety rim serves to protect the operator's fingers when he's working close to the edge of the revolving disc. The basic sander costs less than $10.00 and comes with a spindle for drill press operation. Additional interchangeable spindles for use on motor, grinders, or speed lathe are available as optional extras. Creative Products Co.

12—PIPE COMPOUND for PVC pipe and fittings

C-Lon is a Teflon-based compound reported to prevent galling or binding in the assembling of PVC pipe and fittings, and to allow any assembly to be dismantled in the future by simply unscrewing the fittings. It is explained that because Teflon is self-lubricating, this compound remains so after being used to make up a joint. C-Lon is also claimed to prevent any leakage due to faulty threading. Company says this compound is also suitable for use on stainless, chrome-plated and nickel steels, as well as hard rubber and aluminum. International Supply Co.

13—TWO-WAY RADIO for materials handling trucks

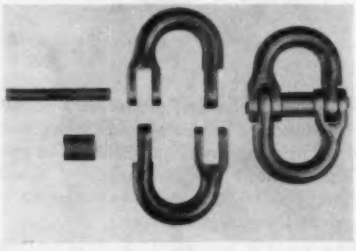
Carfone-150 is a low-power industrial two-way radio system for materials handling vehicles. It incorporates both mobile units and base station equipment, with 3-w input, for operation over the entire 148-174 megacycle band, says company. Compactly styled and engineered for economical operation, the equipment is intended for two-way communication between a central dispatch point and fork lifts, straddle trucks, towing tractors, yard cranes. The mobile unit can be mounted horizontally or vertically, is available for operation on 6-v or 12-v motor-driven vehicles or higher voltage electric trucks and measures 6 in. high, 15 in. wide and 17¾ in. deep. Base station equipment, which combines the mobile transmitter-receiver chassis with an a-c power supply, measures 10¼ in. high, 19¼ in. wide, 18 in. deep. Engineering Products Div., Radio Corp. of America.

14—CONCRETE SEAL requires no preliminary etching

No etching of the concrete is required before using this new sealing product, says manufacturer, and it simplifies maintenance of concrete floors by keeping dirt and grease out of the pores. It gives the concrete a surface that is non-slippery and waterproof and that will prevent dusting. Floors can be sealed immediately after they have set, it is announced, and the seal slows up drying so the floors will cure properly. Colors may be added to the sealing compound, or the sealed surface may be painted. Tests are reported to show that asphalt tile adheres readily to this sealer. Huntington Laboratories, Inc.

15—COUPLING LINK for making own sling assemblies

Hammerlok is announced as a coupling link that lets alloy chain users make up their own sling and special assemblies. Link consists of a pair of body halves, a

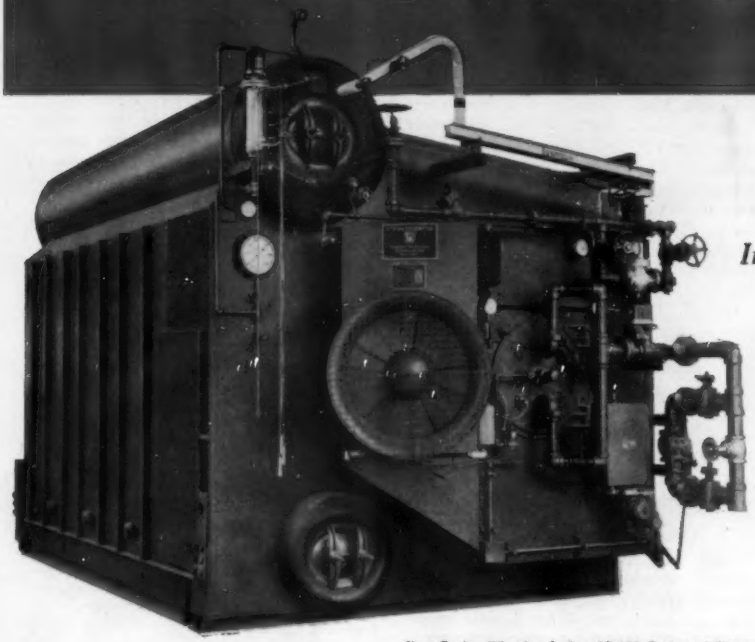


tubular stud and a hardened alloy steel pin. It can be assembled in seconds by anyone who can drive a nail, says manufacturer, and once assembled, it is securely locked by steel pin which bites into steel stud. No peening or welding is required and the link can be disassembled and re-used. Links are forged from alloy steel and heat treated. Columbus McKinnon Chain Corp.

16—PLATFORM TRUCK is built for narrow loads

For handling narrow loads up to 2 tons, this electric-driven truck with a 20-in. wide platform is announced. The low-life truck is described as an unusually stable unit with a self-balancing feature which automatically compensates for uneven floor surfaces, and eliminates frame distortion and uneven load distribution.

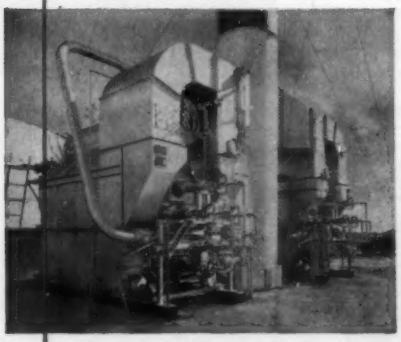
15 YEARS EXPERIENCE
in packaged steam generators



In 1940 the original water-tube packaged steam generators —two Foster Wheeler units— were installed for oil field drilling operations.

New Foster Wheeler Series AG-100 Packaged Steam Generator.

Two FW packaged boilers—the first ever offered to industry—were installed in 1940 and are still in service delivering low-cost steam.



Now, with many successfully operating packaged units in service for processing, heating and generating, backed by 60 years experience in the power industry, Foster Wheeler offers the new "Series AG-100".

The new Series AG-100 shop-assembled water-tube steam generator is supplied for capacities from 10,000 to 46,000 lb steam per hour for oil or gas firing. It provides such significant advantages as baffled steam-collecting internals, the most efficient boiler surface arrangement, tangent furnace side wall and roof tubes which minimize refractory maintenance and provide cool operation, greater adaptability and accessability.

For more detailed information, write for new catalog PG-55-3, *Foster Wheeler Corporation, 165 Broadway, New York 6, New York.*

FOSTER WHEELER

NEW YORK • LONDON • PARIS • ST. CATHARINES, ONT.

For more facts circle 586 on Reply Card

NEW PRODUCTS

(Begins on page 148)

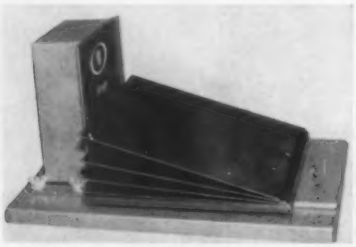
The truck can be had with platform heights of 6, 7, 9 or 11 in., and lengths to suit individual handling requirements. Automatic Transportation Co.

17—PORTABLE VIBRATOR, light and well balanced

Light in weight, the portable type LSRRH Vibrator is described as well balanced and ideal for heavy duty use on portable bins, trucks, concrete forms, septic tanks and large pipe forms that do not require permanent vibrator installation. It is designed to develop 7000 to 8000 vibrations per minute at maximum efficiency. It is available with cast steel bracket for attachment. The Cleveland Vibrator Co.

18—MAGNETIC FLOATER separates steel sheets

Designed for the metal working industry, this magnetic sheet floater is announced as a low cost, non-electric permanent magnetic device that separates stacked

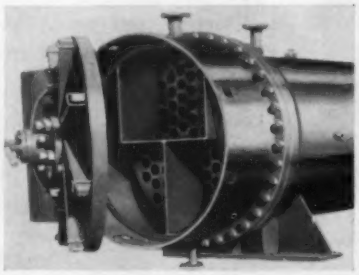


steel sheets automatically for faster, safer handling. These sheet floaters are enclosed in stainless steel, providing protection of the alnico magnet blocks from physical damage as well as from demagnetizing influences of stray iron attracted to the back of blocks. Units are available in seven sizes from 7 to 25 in. Dings Magnetic Separator Co.

19—QUICK-OPENING DOOR for pressure vessels

The Lever-Lock Door is self-seating and designed to reduce the time needed to open heat exchangers, autoclaves, sterilizers and other pressure vessels. Locked and unlocked by bars, the Lever-Lock Door is claimed to take about 5 sec to open. According to manufacturer, this door is particularly suited for use on heat exchangers that carry high-fouling liquids and require frequent entry for inspection. It is declared capable of withstanding temperatures from -70 to 400 F, and pressures from vacuum to 300 psi.

The bars on the Lever-Lock Door are inserted withdrawn by a hand operated lever at the center of the door; this lever opens with a turn of 60 deg and about a 15 lb pull. The door can be swung open manually or by means of a



pneumatic cylinder. A mechanical lock safety device is incorporated to keep the door closed while the vessel is under pressure. The door may be used vertically or horizontally—in vertical operation a pneumatic lifting mechanism is required because of the weight of the doors. The Patterson-Kelley Co., Inc.

20—HEATING PANELS for food processing needs

For such food processing requirements as ham and sausage smoking, and other applications where periodic washdowns are necessary, these rustproof electric radiant panels provide radiant heat work temperatures to 600 F, it is announced. Each panel, measuring 9½ ft long by 37½ in. high, is made of aluminum and Monel with six ⅜-in. diam, waterproof immersion type tubular heating elements mounted lengthwise on 6-in. or closer centers. Each half of the two-piece aluminum reflector may be removed for cleaning. The thermal shock-proof tubular elements connect to a sealed aluminum terminal housing, it is stated, enabling the assembly to withstand repeated washdowns with water, detergents, solvents and cleaners. Severe conditions can be met with special materials.

Design flexibility and ruggedness permit assembly of units into side or overhead tunnel mounting. Work temperatures are controlled by speed of conveyor, distance from panel, and adjustment of element temperature through a manually set, automatic input timer. Edwin L. Wiegand Co.

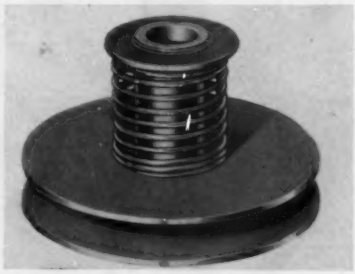
21—REMOTE INDICATOR for limited space uses

Model 216 a remote reading tank contents indicator, is designed for applications where panel space is limited. A dial type instrument, it has a scale length of 20 in. although occupying a panel space of only about 3 by 10¼ in. It is available for either horizontal or vertical panel mounting. Indicator is used with company's automatic hydraulic actuated tank contents gaging systems, and may be located as far as 250 ft from tank. A self-contained hydraulic system provides indicator actuation. No outside power is required. Where level control is required in conjunction with tank contents measurement, switches are furnished. Tank unit is installed thru a single 2 in. diam opening in tank. Once installed, system is said to need no maintenance. Bulletin 532 gives data. The Liquidometer Corp.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 215-216.

22—V-S PULLEY is low cost, versatile ¾ hp unit

This low-cost ¾ hp variable speed pulley, it is announced, can be adapted to new or old equipment. Initial economy is achieved through use of minimum number of parts, company states, yet features necessary for delivery of efficient power and



smoothness of operation have been retained. Simplicity of design is said also to reduce maintenance and upkeep. In addition, oil impregnated bronze bearings are used to eliminate further lubrication. Pulley delivers a speed ratio to 2¾ to 1, using an A section belt. Maximum bore is ⅞ in. with keyway. Shaft bore runs through entire length of the pulley, giving added advantage of reverse mounting when necessary on special installations. Spring cover is eliminated since, it is pointed out, the pulley is usually used in the enclosed portion of machinery. Extremely compact, unit measures 4⅛ in. long, 6 in. diameter. Weight is 6½ lb. Lovejoy Flexible Coupling Co.

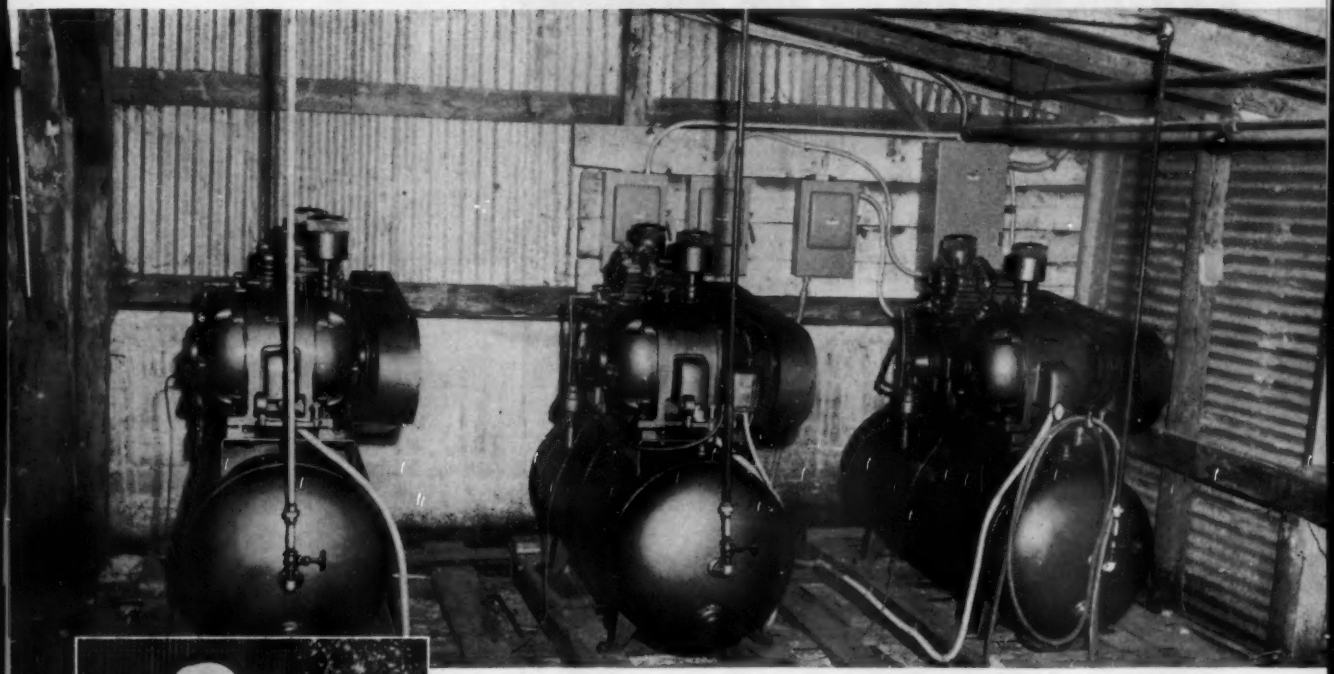
23—ALL-ANGLE DRILL puts holes in tight spots

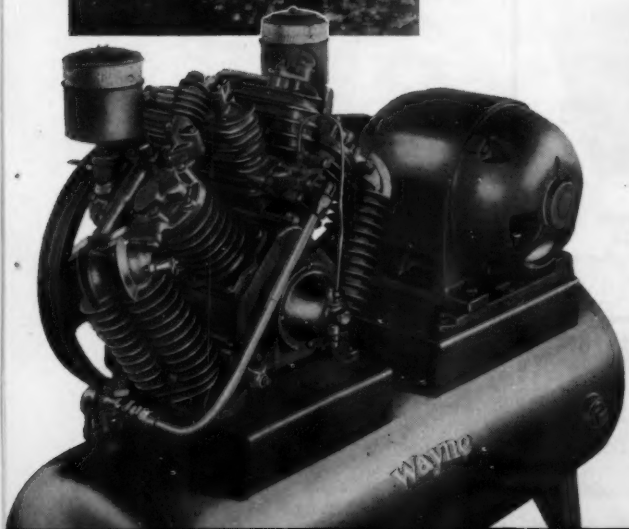
For the difficult drilling problems, the P & C All-Angle Drill is designed to drill holes where other drills can't. The 0- to ¼-in. capacity chuck swings in a 270-deg arc, and has a spring lock to let you change angles with a flip of the thumb. The handle turns in a 180-deg arc at right angles to the chuck movement, and is held in its several positions by an adjusting screw. Storage space is provided in the hollow handle for an assortment of drills. The drill sells for less than $5.00. P & C Hand Forged Tool Co.

24—MOTORS, standard and explosion proof types

This line of standard and explosion-proof totally enclosed motors features corrosion-resistant cast iron frames, improved winding insulation and heavy-duty ball bearings. Grease fittings are

"PAID FOR ITSELF IN LABOR SAVED"





WAYNE *Production - Booster* COMPRESSORS

PRE-TESTED GUARANTEED FULL-RATED AIR POWER ON EVERY JOB

● In the cotton warehouse of Shiner Compress & Warehouse Co. at Shiner, Texas, Wayne Air Compressors have proved their ability to boost production and save money too! The cotton cleaning unit consists of three 6408H, 10 HP Wayne electric air compressors arranged to use one, two or all three at once, depending on the amount of air needed.

The words of the manager speak for the success of Wayne Compressors, "Four men on this unit can clean more cotton per hour than twenty or more by hand picking. I have also connected the line to the sprinkler system to maintain pressure . . . now use air on my Loose press instead of steam with big savings . . . air on grease guns allows easier maintenance of rolling stock. This Wayne unit has already paid for itself in eight months by actual labor saved. It is economical to run and the maintenance is about nil."

If you want to get the most for your dollar invested be sure to investigate the extra value you get in every Wayne Production-Booster Air Compressor. Remember you get guaranteed, full-rated output in every Wayne compressor. Write for the booklet that tells you all about how to boost production.

THE WAYNE PUMP COMPANY

Industrial Division • *FORT WAYNE, INDIANA*

SALISBURY, MARYLAND • TORONTO, CANADA

Wayne
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LUBRICANT DISPENSERS

INDUSTRIAL PUMPS

INVADER PUMPS

HERC-ALLOY

THE ORIGINAL ALLOY STEEL CHAIN

- Herc-Alloy is a special all-purpose chain with long-wearing properties and high resistance to impact loading.
- Herc-Alloy is sold in running lengths and in all types and sizes of sling chains assembled to customers' specifications.

- Write for Bulletin 100 covering Herc-Alloy Sling Chains, including helpful information on their care, use and inspection.

- CM also produces a complete line of chain attachments and welded chain of all types including stainless steel and bronze.

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Herc-Alloy®

For more facts circle 588 on Reply Card

NEW PRODUCTS

(Begins on page 148)

provided at top and bottom of bearing housing to permit convenient lubrication and removal of old grease. A running shaft seal on each end of fan-cooled motors and on the drive end of non-ventilated motors serves to keep out moisture, dirt and other contaminants.

Current production includes ratings 1 through 10 hp, 4-pole, 60-cycles in re-rated NEMA frames 182 through 256U. Frames 213 and larger are cast with heavy ribs for efficient cooling. Bulletin MU-203 provides full information. Wagner Electric Corp.

25—IMPROVED SEPARATOR for compressed air

Through its arrangement of cleaning elements, the Textite Air Separator is designed to remove unwanted by-products of compressed air without the aid of moving parts or filter elements, which must be replaced. It is explained that only the air stream moves throughout the unit where centrifugal action, jetting, sudden expansion, capillary attraction and scrubbing is brought into play to remove contaminants . . . water, oil, dirt, scale, cinders. Chicago Mfg. and Distributing Co.

26—BALL BEARINGS for medium duty service

SCM Ball Bearings are announced as incorporating all features of company's present SC series in addition to providing more load carrying capacity. They are also available in larger shaft sizes. The new line includes both ball bearing pillow blocks and ball bearing flange cartridge mounts. According to manufacturer, the rugged semi-steel outer housing affords greater strength with a trim, streamlined appearance; and full self-alignment is provided by the spherical outer race of the ball bearing inner unit which fits into the spherical seat in the housing.

Metallic-backed synthetic seals are mechanically anchored in position and will not blow under grease gun pressure, it is noted, and the lubricant is sealed in. A locking pin is used to prevent rotation of outer bearing race while allowing self alignment. SCM Ball Bearings come fully assembled, pre-lubricated and ready to mount on the shaft. The bearing is locked to the shaft by two set screws. Dodge Mfg. Corp.

27—HEAVY-DUTY RELAYS take less panel space

A line of 10-amp control relays, designed to occupy minimum panel space without sacrificing ruggedness, is said to afford easier wiring and maintenance. The line, the Type PM, includes 2- to 12-pole relays. They feature a sectional pole design in which each pole is mounted in its own melamine block. Poles are individually removable and replaceable.

NEW PRODUCTS

(Begins on page 148)

Another advantage cited is that relays with up to 8 poles are available without wiring and vertical space requirements of double-decking. Two basic sizes of the Type PM cover all relay needs from 2 to 8 poles, says company, and two magnet coils for a given voltage will cover almost any combination of normally-open and normally-closed contacts up to 8 poles. Clark Controller Co.

28—TORCH KIT for heat and flame jobs

The propane-fueled Bernz-O-Matic TX888 Torch Kit is available for the many jobs that require heat and flame. Built around company's disposable fuel cylinder, this kit also contains a pencil flame burner unit, utility burner head, flame spreader, and soldering tip. These five items purchased separately would cost $12.60, says manufacturer, but the kit sells for less than $9.00. Otto Bernz Co., Inc.

29—AIR VALVE is low cost, foot-operated unit

Model 2800 is a four-way, foot operated air valve incorporating company's Shear-Seal principle and offered at a competitive price—less than $25 for the ¼ in. size. For the shop air range up to 250

psi, this valve is designed to make plumbing and mounting easier. Any port may be used as the pressure port, says manufacturer, and for most convenient piping, the valve body can be rotated in 90 deg increments. A mounting bracket is an integral part of the valve. The valve has three possible settings: spring return to either extreme, to the center, or without spring return. The valves are available in ¼ and ⅜ in. port sizes, Shear-Seals are brass, rotor is bronze, shaft and detent ball are stainless steel, and valve body and housing are made of aluminum. Barksdale Valves.

30—ROUND LEAD ANODES for chromium plating

Designed to give better current distribution over the entire anode area, this new round lead anode is also said to permit faster plating, better chromium coverage and the use of higher current densities. Made of a tin-lead alloy, this anode elim-

CM Hammerlok®
COUPLING LINK
Greatest Chain Development of the Day!

A typical Herc-Alloy chain assembly made up with Hammerlok coupling links.

NO PEENING
NO WELDING
The Hammerlok link is securely locked by the alloy steel pin which bites deeply into the tubular stud. The locking arrangement is hidden and inaccessible.

NOW... you can make up Herc-Alloy chain assemblies yourself... with economy, speed and SAFETY.

HAMMERLOK FEATURES

● SIMPLE ASSEMBLY—Expert help is unnecessary. This link can be properly assembled by anyone who can drive a nail.

● RUGGED DESIGN—The Hammerlok link has been thoroughly field tested. It withstands the severe usage to which alloy chain is so often subjected.

● GREAT STRENGTH—Hammerlok links are stronger than Herc-Alloy chain.

● RE-USEABLE—Hammerlok links can be disassembled and re-used.

● NO WORRY—The human factor plays no part in the assembly or safety of this link, since skill is not required in its assembly.

A BOON TO CHAIN BUYERS AND USERS

No longer do you have to wait for custom made (or repaired) alloy chain assemblies to reach you from the factory. Now you (or your distributor) can stock assorted sizes of Herc-Alloy chain and attachments... plus an assortment of Hammerlok links. Then, when you need a new or rebuilt alloy chain assembly, it can be made up in a jiffy.

● Ask your distributor about Hammerlok coupling links today.

● Write for folder describing use and assembly in detail.

NOTE

Hammerlok coupling links are NOT sold as repair links for body chain. When the body chain in an alloy chain assembly requires repair, the entire section of chain should be replaced or the complete assembly returned to the factory for reconditioning. Hammerlok links ARE recommended for replacing complete sections.

Made by the makers of HERC-ALLOY—the original alloy steel chain

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Soap
is only one of the many
viscous liquids or semi-liquids which
WARREN-QUIMBY
Double External Bearing and Gear Hopper Type Pump
will handle and with no meshing of gears or violent mixing.

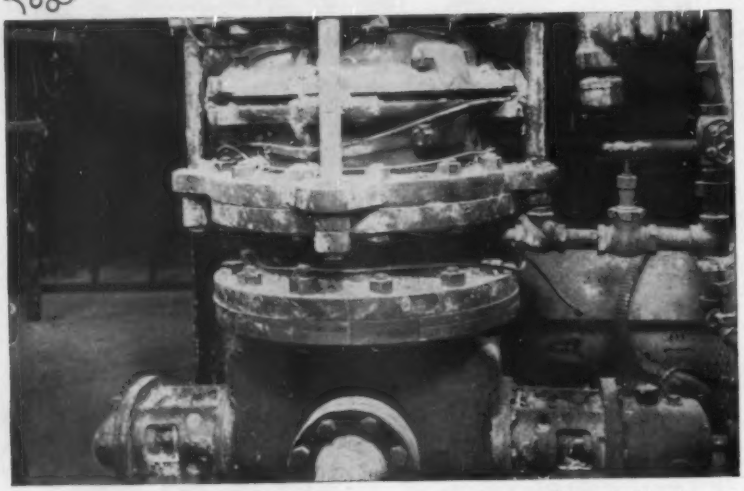

Photo: Courtesy of Lever Brothers Company
Warren-Quimby Hopper Type Screw Pump handling soap mixture.

Such materials, for instance, as acetates, dopes, tar, sludges, chewing gum, tooth paste, chicle, food products and other items where a short, unobstructed suction opening must be provided, can be satisfactorily pumped. Also, these pumps handle applications requiring the filtering of viscous liquids at pressures up to 1000 p.s.i.

It will pay you to ask for Bulletin S-206, which gives the mechanical details, etc., of this highly specialized type of Rotary Pump.

WARREN QUIMBY PUMPS

CQ-7

WARREN PUMPS
WARREN STEAM PUMP COMPANY, INC.
Warren, Massachusetts

For more facts circle 590 on Reply Card

NEW PRODUCTS

(Begins on page 148)

inates selective corrosion caused by foreign metal inclusions, company reports. This alloy is declared suitable for use in all chromium solutions; other alloys are available.

The anode is extruded to provide a dense non-porous structure, and its simple heavy cross section is said to let it stand high current density without overheating or warping. Insulated hooks are lead burned to the anode to provide positive contact for the life of the anode. Besides reducing problems of chromate scale and corrosion and affording even anode wear, the round shape is claimed to make the anode easier to clean and reduce maintenance. The anode comes in 1½- and 2-in. diam, in lengths from 12 to 50 in. Hanson-Van Winkle-Munning Co.

31—VACUUM CLEANER has wet-dry pick-up

The Vacmobile is a wet-dry industrial cleaner featuring large rubber wheels and handle bar for convenient carry. This design lets the machine glide over carpet edges and sills and climb ramps and stairs without lifting, it is pointed out, and makes it easily maneuverable. The Vacmobile is powered by a 1¼ hp motor with safety by-pass feature for picking up water and detergents from floors. Recovery capacity of the unit is 12 gal, or 1½ bu of dirt. Available for use with the Vacmobile is the ball bearing Master Tool which comes equipped with slide-on adapters to meet many cleaning needs. West Disinfecting Co.

32—"FADE OUT" PAPER for tracing, now comes in rolls

This time-saving paper is printed with light-blue cross section rulings which disappear on direct print reproductions and blue prints. Using the printed grid as a guide, scale drawings are easily and accurately made, says manufacturer; also freehand lettering is quickly applied, and pencil ink lines can be erased repeatedly without "ghosting." Fadeout grid paper is suggested for wiring and plumbing diagrams; structural and schematic drawings; plant layouts. It is available in 20-, 50- and 100-yd rolls, in widths from 24 to 42 in., in 16- and 20-lb stock, with grid lines 8-by-8 or 10-by-10 to the inch. A catalog with prices and sample sheets is offered qualified plant engineers. Clearprint Paper Co.

33—SILENCER cuts noise from pressure reduction

Noise caused by pressure reduction operations need not be a problem in natural gas distribution and steam systems, says manufacturer of the PRS Silencer; by means of this silencer, pipe ring and resultant noise radiation within the regulator system and over the surrounding area can be eliminated. The silencer is installed in the downstream piping near

A
B
C
D
E
PROPER COOLANT FILTRATION CAN:
A Eliminate frequent throwaways, reducing amount of coolant used by as much as 50%.
B Cut number of wheel dressings in half, increasing wheel life.
C Completely eliminate hundreds of man-hours per annum on sump cleaning and sump pump maintenance.
D Boost efficiency of grinder, increasing machine output.
E Definitely raise quality of work, holding closer tolerances, with resultant savings through fewer rejects.
A filter's got to be good—and right, to save money

PROPER FILTRATION

can save you thousands in maintenance and materials

For fuel, hydraulics, lube . . . any fluid – in thousands of applications in industry . . . filters that are properly selected and installed pay for themselves in a surprisingly short time. They render a substantial saving month after month from then on. You want facts, not adjectives? Take a look at the information on grinder coolant filtration in our illustration.

Naturally you'll insist on a quality filter. That goes without saying if you specify Purolator. But using the correct filter for your application can make a surprising difference in money saving results, too.

The Purolator line has been developed on a broader scale than any other filter line for just that reason. Purolator gives you a wider selection of standard units so your exact requirements can be met economically. And you get the valuable technical assistance of America's oldest and most experienced filter manufacturer to guide you in selecting the best unit for you.

This combination of engineering and manufacturing experience can add up to substantial savings. Send for Purolator's General Industrial Catalog, or better yet, ask us specific questions about possible filter applications in your plant. No obligation, of course. Address Dept. P1-94, Purolator Products, Inc., Rahway, N. J.

PUROLATOR

"FIRST IN THE FIELD OF FILTERING"

PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory Branch Offices; Chicago, Detroit, Los Angeles

For more facts circle 591 on Reply Card

WATER *costs* MONEY

Here's a Simple Way to *Reduce* the Cost

The costs of pumping, purifying, softening and distributing water are something to reckon with. Whether you buy from your local utility or pump your own, your plant water supply probably costs more than it should. Hoses left running, cooling water running down the drain instead of recirculating, neglected leaks, etc., quickly add up to large losses. What's worse, they deplete scarce water resources. Even the cost of sewage disposal depends upon *water* used.

Send for free technical Bulletin 566 XPE

Best way to cut these costs? Put Neptune water meters at every key point. Get water out of overhead and charge it fairly and squarely against each department or process. What stronger incentive to fix faulty equipment and stop careless habits?

Other Neptune meters also available for handling more than 150 industrial liquids. Ask today for full details . . . or a complete plant survey at no obligation.

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In Canada: NEPTUNE METERS LTD., TORONTO 14, ONTARIO

neptune Liquid METERS

For more facts circle 592 on Reply Card

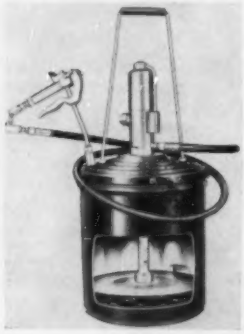
NEW PRODUCTS

(Begins on page 148)

the reduction valve, to stop the noise at its source. The unit is designed in accordance with applicable code requirements for piping and pressure vessels, it is noted, and it does not restrict flow of gas or steam in the line. Pressure drop through the silencer is claimed no greater than through the equivalent length of pipe. Burgess-Manning Co.

34—POWER GUN speeds up lubricating jobs

A portable air-operated gun, the Model 711-H is said to save 6 man-hours for every 25 lb pail of lubricant applied, and to be capable of power lubricating any machine. Pumping directly from original 25- or 35-lb pails of lubricant, this



gun is designed to deliver up to 14½ oz of lubricant per minute. A 6-ft high pressure hose, Z swivel and control valve afford convenience of operation. Because it develops a pressure ratio of 40 times the air pressure used, the new unit is claimed well suited for smaller shops where lubricants are purchased in the smaller quantities.

Economies in handling lubricants are realized in that transferring and loading operations are eliminated; a follower plate cleans grease out of the pail, and an easily-applied cover (adjustable to either size pail) seals the lubricant against contamination. The unit weighs only 12½ lb. Alemite Div., Stewart-Warner Corp.

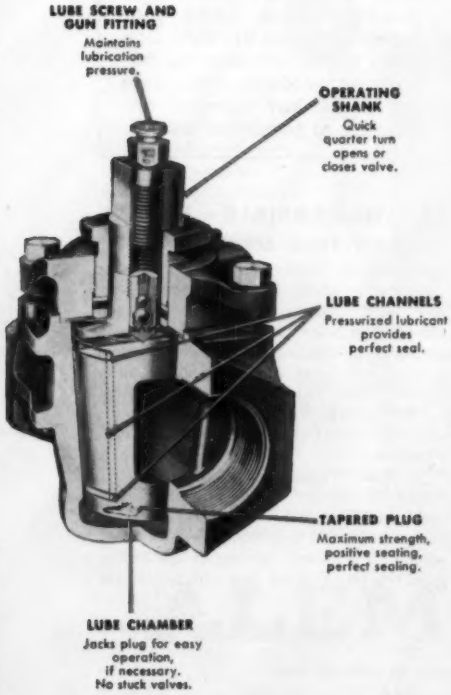
35—CONCRETE GLUE bonds the new to the old

Pree-Mix Concrete Glue is a plastic adhesive which is water soluble in liquid state but dries to a permanent, waterproof, acid-resistant bond, manufacturer announces, permitting permanent patches to be made to broken or cracked concrete surfaces. To use this concrete glue, you clean the broken surface with water, apply some glue with brush, add quantity of the glue to prepared patching material and mix together, then apply the patching material to the broken area and trowel it. Company recommends 1 qt of Pree-Mix for every sack of cement used in the patching material, part of which is brushed on the old surface. The glue is

Let's Talk About Cost

Rockwell-Nordstrom Valves

Cost No More Than Ordinary Valves!


LUBE SCREW AND GUN FITTING
Maintains lubrication pressure.
OPERATING SHANK
Quick quarter turn opens or closes valve.
LUBE CHANNELS
Pressurized lubricant provides perfect seal.
TAPERED PLUG
Maximum strength, positive seating, perfect sealing.
LUBE CHAMBER
Jacks plug for easy operation, if necessary. No stuck valves.

You don't pay a penny extra for the trouble-free dependability of Rockwell-Nordstrom valves—proved through 40 years of lubricated plug valve leadership. In fact, it's the most economical valve you can buy at any price.

Pressure lubrication, which forms the famous Rockwell-Nordstrom leak-proof seal, also eliminates repair-replacement cost caused by the "wear-out" friction of metal-to-metal contact in ordinary valves. And the lubricant protects the valve working surfaces against corrosive and erosive line materials while keeping the plug free for instant, smooth quarter turn operation.

The valve seat, the part that wears out the fastest in ordinary valves, is *never* exposed to the line when you use Rockwell-Nordstrom valves . . . eliminates one of the biggest valve down time problems.

Remember, these exclusive advantages are *not premium priced*. While Rockwell-Nordstrom valves cost no more than most ordinary valves, that's just half the story . . . they'll outwear, outlast and outperform any other valves you've ever used.

Rockwell-Nordstrom valves are available in a full range of pressure-temperature ratings and sizes in steel, semi-steel and numerous corrosion resisting metal alloys. Send the coupon today for complete details. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

ROCKWELL-Nordstrom VALVES

LUBRICANT SEALED FOR POSITIVE SHUT OFF

ROCKWELL MANUFACTURING COMPANY, Pittsburgh 8, Pennsylvania 5-J

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Exclusive Feature saves you money

Clarage's unique Syncrotherm Control maintains uniform heating with relatively low temperature air in constant circulation. By-pass dampers control the amounts of air passing through and around heating coil. Result: better use of each BTU at lower cost. Investigate this and the other features of the Unitherm Unit Heater — available for steam or hot water operation, floor or ceiling installation, in a wide size range. Write for Catalog 1115. CLARAGE FAN COMPANY, Kalamazoo, Michigan.

. . . . dependable equipment for making air your servant

CLARAGE FAN COMPANY
Kalamazoo, Michigan
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SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

For more facts circle 594 on Reply Card

NEW PRODUCTS

(Begins on page 148)

claimed heat-resistant and non-toxic and suitable for gluing concrete to wood, plaster, plastic, steel, glass and other materials. General Material Co.

36—HEAVY-DUTY SWITCH, light operating force

This heavy-duty limit switch, which can be operated with only 2½ oz of force, is announced for use on counting devices or similar applications. The switch's actuating lever is a 5-in. aluminum rod, ⅛ in. in diam, which can be bent or cut off as required. Operation can be clockwise or counterclockwise, and 60-deg overtravel is provided to permit use where operating motions cannot be accurately controlled. An aluminum enclosure protects the switching unit, seals the switching chamber against entry of foreign matter, provides a means of mounting and permits conduit type wiring. Two contact arrangements are available: Type 1ML10 is a single-pole double-throw and the Type 101ML10 is a two-circuit break. Both are listed for 10 amp at 120, 240 and 480 v. Micro-Switch, Div., Minneapolis-Honeywell Regulator Co.

37—SCRAP CHOPPER, ram operated, larger size

Announced as the only scrap chopper of its type and capacity, the Model M-3 is a ram operated unit designed to handle material up to 10 in. in width and up to 0.100 in. thickness. It is priced at $165. Durant Tool Supply Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 215-216. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

38—SUBMERSIBLE MOTOR, wet type construction

Designed for water well pumping, this submersible motor is announced as having "wet" type construction in which entrance of water into motor will cause no harm to windings. A special process is used to encase copper windings in a plastic armor impervious to water. Motor is claimed immune to leaky joints, wear of seals, condensation, impurities, vibration.

To guard against internal corrosion, motor is factory filled with a highly stable emulsion of oil and water. Weight of rotating parts and pump thrust is supported by a thrust bearing of the tilting shoe type, and radial bearings are of the

time studies prove it!

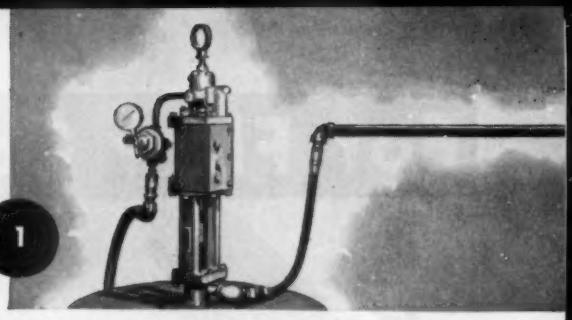
95 man-hours saved for every 400 lbs. of lubricant you use!

Alemite cuts costs!

all the way from barrel to bearing ...in maintenance...repairs... down-time... YOU SAVE...STEP BY STEP!

With operating costs sky-high, any saving is important. And with this Alemite lubrication system you *start* with a saving of 95 man-hours for every 400-lb. drum of lubricant used. And far more important than this initial saving is the saving in *machine hours*—decreased maintenance costs—increased efficiency and output.

Alemite Barrel Pumps fit directly into either a 400 or 100 pound drum, send lubricant wherever it is needed anywhere in the plant. Or drum and pump can be placed on a wheeled dolly to go right to the machines. You get the big advantage, the protection, of a completely sealed system. Lubricant reaches bearings "refinery clean," with no mess or waste.



An Alemite Barrel Pump, either air or electric powered, is inserted in a fresh drum of lubricant. Lubricant is still sealed—"refinery fresh."

Now the Barrel Pump supplies lubricant, through pipe, anywhere in the plant. Operator simply carries a hose and control valve to the outlet, hooks it in, applies lubricant.

Where piping of lubricant is not practical, power lubrication can be brought right to the machine by simply mounting drum and pump on a dolly.

Machines get the time-saving protection of power lubrication regardless of whether pump is portable—or stationary for piped systems or overhead reels.

With Alemite Plan "D"
Lubricant is "Refinery Clean" Wherever Applied!

These applications of Alemite Barrel Pumps to provide tailored power lubrication are known as Alemite Plan "D". This is one of the five Alemite plans that your trained Alemite representative can show you. Ask him for your free copy of the new Alemite booklet, "5 Plans for Better Plant Lubrication"—or use the coupon at the right. It will show you how to save money in your plant!

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Butterfly Valves

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2—Minimum Turbulence
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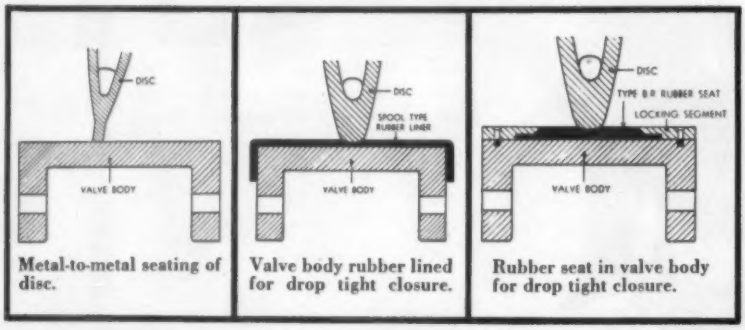
5—Manual or Automatic Control
6—Lower Installation Cost
7—Light Weight—Compact
8—Reduced Installation Space
9—Less Maintenance

42"—125# butterfly valve with hard chrome edged disc, stainless steel shaft, bronze bearings and enclosed worm gear, handwheel operator. Valve body lined with rubber for drop tight shut-off at 140 p.s.i. water pressure.



Metal-to-metal seating of disc.

Valve body rubber lined for drop tight closure.

Rubber seat in valve body for drop tight closure.

In W. S. Rockwell Butterfly Valves you have the most completely engineered line for power and industrial pipe line and equipment control of air, gases, liquids and semi-solids. Standard valves are built in sizes to 72" for low pressures as well as 25-, 50- and 125-lb. service, in any required combination of metals, with manual or automatic operators. Larger sizes and higher pressures can be built to specifications.... Write for catalog.

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For more facts circle 596 on Reply Card

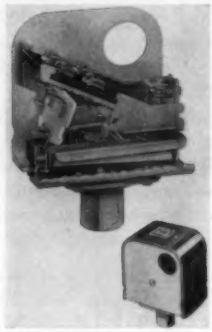
NEW PRODUCTS

(Begins on page 148)

hard babbitt sleeve type which contact the stainless steel motor shaft. Because of the water/oil emulsion, there is no need to lubricate motor at any time, it is pointed out. A control box with heavy enclosure and hinged lid is provided, containing starting capacitor, relay, overload device, motor data, wiring diagram and connection terminals. The motor comes in ratings from ⅓ to 2 hp, single phase, and 1½ and 3 hp, three phase. Bulletin F-1870 gives full details. U. S. Electrical Motors Inc.

39—PUMP SWITCH for shallow well water systems

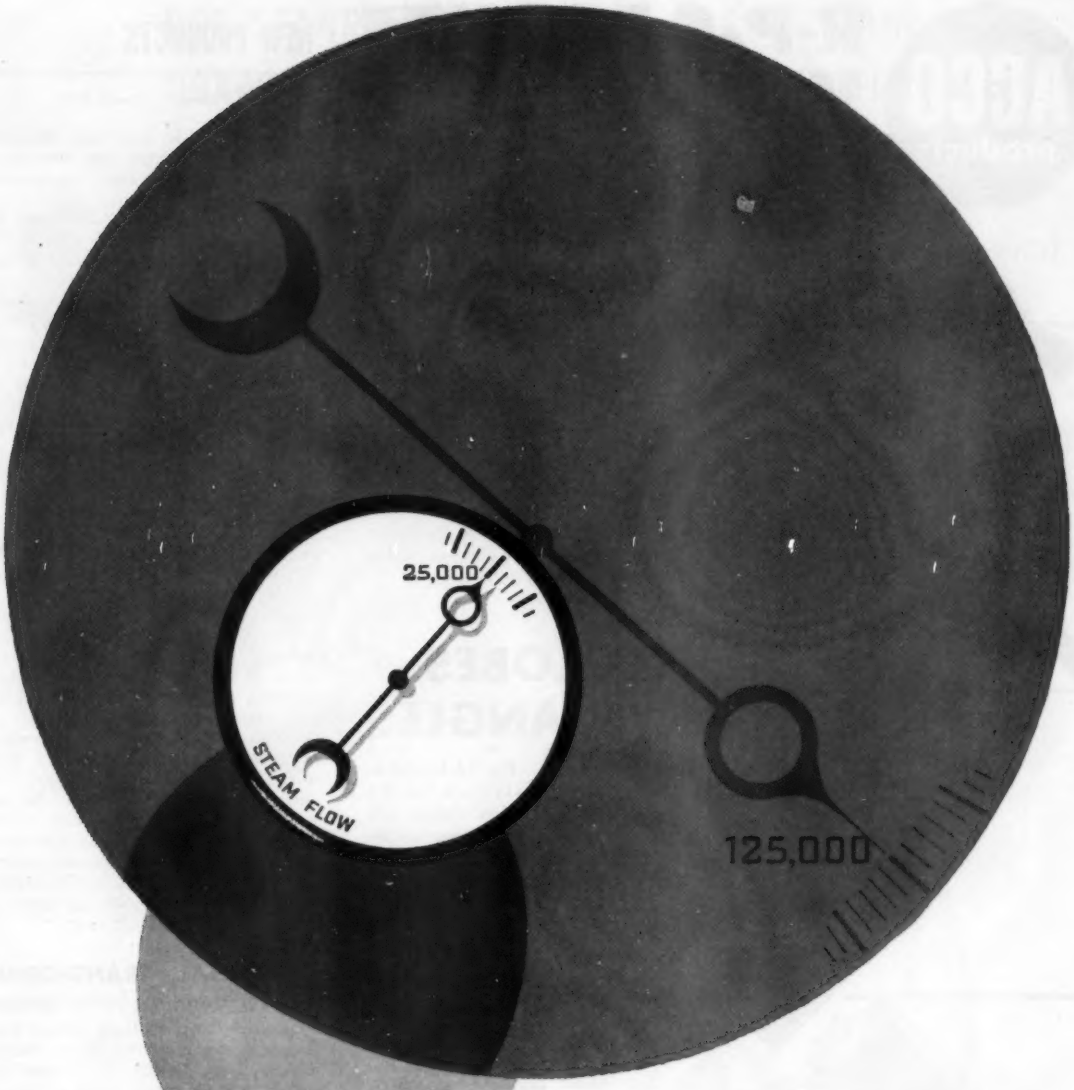
Class 9013, Type JSG Water Pump Switch is announced as a low cost device for use in shallow well water systems involving pressures to 60 psi. The switch is said to save money in three ways: first, initial low cost; second, reduction



in installation time because of generous wiring space, slip-on cover with no screws to tighten, and simplified wiring in either horizontal or vertical position; and third, low maintenance cost due to rugged, corrosion resistant parts. Easily replaceable contacts are double break, silver-to-silver, and visible, it is noted, and they are self-cleaning. A nylon impregnated diaphragm is used for longer life. Device can be serviced in the field. Range and differential setting are adjustable. As with other pump and motor control devices, company has available prepared packaged repair parts kits. Square D Co.

40—QUENCHING OIL improves the cooling rate

Extremely fast cooling rates in conventional quench set-ups are announced for Voluta Oil 23. Manufacturer of the oil says it has unusually high oxidation stability and causes little smoke and flame during normal hardening operations. In some instances, Voluta Oil 23 is reported to have made possible the quenching of low carbon or alloy steels in oil, where formerly water was necessary. The oil's cooling rate is declared sufficiently high initially to avoid unwanted transformation products, yet slow enough in final stages to control such dangers as warp-



get these 4 Ljungstrom® savings in small boilers...too!

The *completely shop-assembled* Package Ljungstrom Air Preheater brings to boilers as small as 25,000 pounds of steam per hour the four proved advantages of regenerative preheating:

1. Saves fuel. This reduction in fuel consumption can be sizeable . . . and can write off the cost of the unit in about a year. For in most installations yearly fuel costs match the initial cost of the boiler.

2. Boosts boiler output. Preheated air intensifies the combustion process. Heat absorption into boiler tubes increases correspondingly, raising the unit's capacity to produce steam.

3. Increases boiler reliability. Since combustion is more efficient — fuel is burned more completely . . . there's less slagging . . . boilers stay on line longer. What's more, stack gases should be cleaner.

4. Burns lower-grade fuels. Higher furnace temperatures make practical the burning of lignites and similar low-grade fuels.

Find out how the efficient, low-cost Package Ljungstrom Air Preheater can be applied to your steam-generating units. Write, today, to The Air Preheater Corporation.

The Package Ljungstrom operates on the continuous regenerative counter-flow principle. The heat-transfer surfaces on the rotor act as heat accumulators. As the rotor revolves, the heat is transferred from the waste gases to the incoming combustion air.

The Air Preheater Corporation

60 East 42nd Street, New York 17, N. Y.

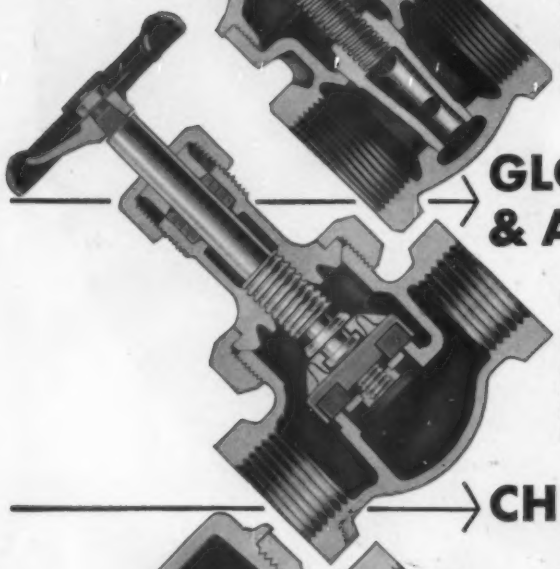
For more facts circle 597 on Reply Card

ACCO products

R-P&C BRONZE VALVES—125, 150, 200 AND 300 LB. PRESSURE CLASSES

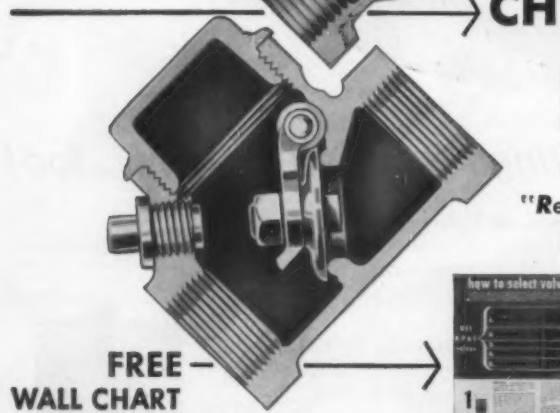
GATES

Fig. 86 illustrated, rated for 125 lbs., steam, 200 OWG, has stationary stem, solid wedge, screwed ends. Other 125 lb. models with screwed bonnet, rising stem, solid or split wedge.



GLOBES & ANGLES

Fig. 1A Globe illustrated, rated 150 lbs. steam, 300 OWG, has renewable asbestos disc, union bonnet. Also furnished as Angle. Sizes ⅛" to 3".



CHECKS

Fig. 198 illustrated, rated for 125 lbs. steam, 200 OWG. Other swing check valves in 150, 200, 300 lb. classes.

"Reliable Protection & Control"

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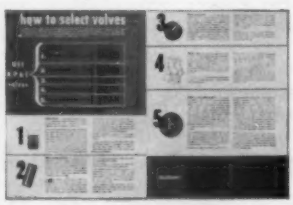
WALL CHART
"HOW TO SELECT VALVES"
Write for your copy



ACCO

R-P&C Valve Division
AMERICAN CHAIN & CABLE

Reading, Pa., Atlanta, Boston, Chicago, Denver, Detroit, Houston, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

Better Values

For more facts circle 598 on Reply Card

NEW PRODUCTS

(Begins on page 148)

age, cracking or distortion. Also, it is pointed out, the high heat removal rate of the oil can often make step-quenching procedures unnecessary.

Other advantages claimed are high water tolerance and low volatility and drag-out losses. The oil drains off hardened parts quickly, says company, affording lowest carryover into subsequent operations—a characteristic which not only cuts the loss of oil but also slows down contamination of tempering salts. Voluta Oil 23 is declared compatible with heat treating salts. Both flash point (380 F) and fire points (425 F) are higher than usual, it is pointed out; the pour point is typically 25 F. Shell Oil Co.

41—CHEMICAL GROUTING for underground structures

Announced as an effective means of preventing seepage of ground water into basements and pits, shafts and other underground structures, the Chemject System utilizes an acrylic monomer, CJ-1, in aquaeous solutions applied by injection techniques. According to company, this chemical has the ability to impart cohesion to sand and gravels and to render pervious soils impervious. When injected under controlled conditions, the chemical polymerizes within the sand voids to produce a compressive strength of about 20 psi. The reduction in permeability prevents flow of ground water, it is explained, and the increase in strength facilitates excavation through sand with vertical cuts. Chemject Corp.

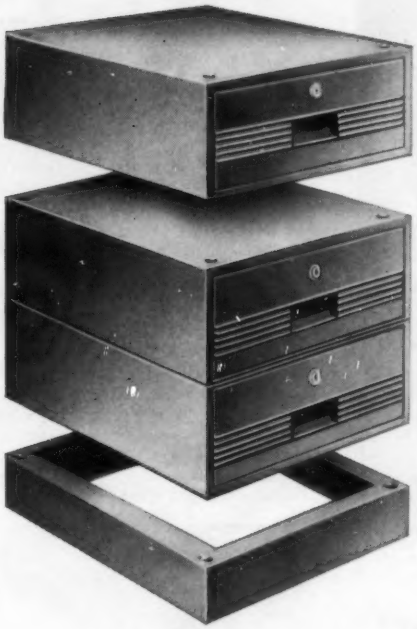
42—BURIAL TRANSFORMER, for mercury lamp systems

This direct burial constant wattage transformer is announced for use on multiple mercury lamp circuits. It is sealed in a rubber case for direct burial in multiple circuit mercury lamp systems. The transformer can be used for parking lot and other outdoor lighting systems, and can be buried in the ground next to the pole base, or placed in the pole base. By burying transformer in the ground, pole base can be eliminated, company notes, and since transformers are completely sealed, they require virtually no maintenance. Jefferson Electric Co.

43—TUBEAXIAL FANS for difficult air moving jobs

Belt-driven tubeaxial propeller fans designed for handling corrosive exhaust, high temperature, explosive fumes and similar applications are available in five sizes from 16 through 36 in., with air delivery ratings to 26,000 cfm. In this line of fans, the Type BT, the fan drum is rolled from 12-gage steel plate. Integrally rolled mounting flanges and continuous welded seam are utilized to eliminate fume or condensate leakage and subsequent corrosion. Belt housing

USE STANDARD HALLOWELL DRAWERS AND DRAWER TIERS IN PLANT MODERNIZATION



CATALOG NO. 320-1415
3 DRAWERS 14"x15"x5". OVERALL DIMENSION OF ENCLOSURE: 15¼"x15¼"x6 9/32". BASE 3¼" HIGH. ALSO WITH DRAWERS 14"x20"x5" AND 20"x20"x6"

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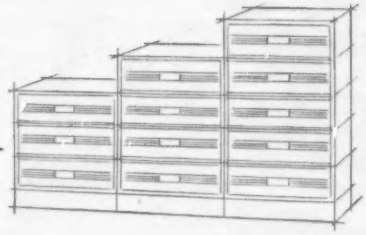
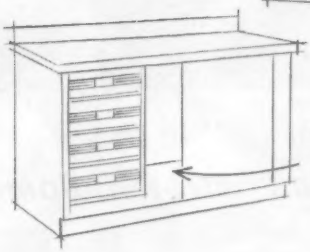
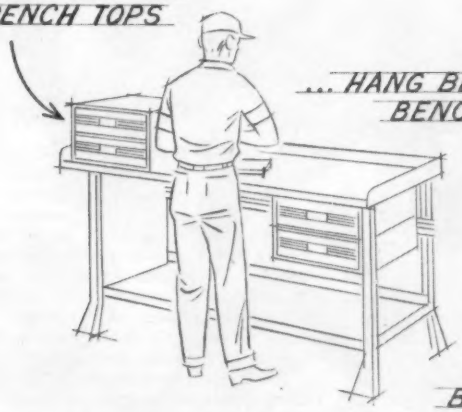




USE THEM INSIDE CABINET BENCHES

PUT THEM ON BENCH TOPS



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Then... a tube "let go" in the electronic control equipment!

And when a "control" stops operating there's no production, or, at best, only limited output. That's one of the important reasons why RCA "Special Reds" are used in industrial electronic equipment—they *minimize production slow-downs and shut-downs due to tube failure!* They have built-in "spare" life. Only RCA "Special Red" Tubes offer all these advantages:

- *extra long-life—10,000 hours minimum*
- *exceptional stability throughout life—even under extreme variations in humidity and temperature*
- *extreme uniformity of characteristics from tube to tube*
- *high resistance to shock and vibration through rigid construction.*
- *selected high quality materials and superior workmanship*

RCA "Special Red" Tubes are recommended for initial designs in industrial electronic equipment. They can be used as replacements in existing circuits where there is a prototype operating under conditions within the ratings of the "Special Reds," and where 10,000-hour life, exceptional stability, and extreme uniformity of characteristics are specially needed.

Contact your local RCA Tube Distributor today for your copy of the booklet "RCA Receiving-Type Tubes for Industry and Communications."

RCA-5690—Full-Wave Vacuum Rectifier.

RCA-5691—High-Mu Twin Triode. Similar to RCA-6SL7-GT, but has twice the heater current.

RCA-5692—Medium-Mu Twin Triode. Similar to RCA-6SN7-GT.

RCA-5693—Sharp-Cutoff Pentode. Similar to RCA-6SJ7.

RCA **RADIO CORPORATION of AMERICA**
ELECTRON TUBES HARRISON, N.J.

For more facts circle 600 on Reply Card

NEW PRODUCTS

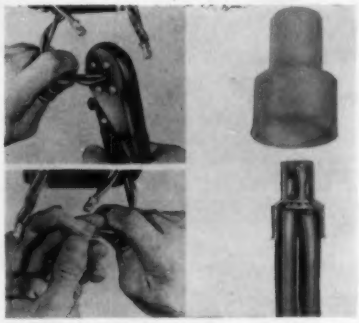
(Begins on page 148)

is also 12-gage steel plate, and is streamlined for least resistance to air flow.

Other design advantages of the fans include the motor-mount assembly which permits 3-in. belt adjustment and is drilled to accommodate any motor from ¼ to 5 hp, 1725 rpm to facilitate motor changes; propellers cast from an aluminum-magnesium alloy said to provide high tensile strength and dimensional stability, and to have greater corrosion resistance to mild alkalies than many propeller metals; and a one-piece cast-iron housing which isolates fan bearings. The fans are powered by company's All-Weather Motors, Propellair Div., Robbins & Myers, Inc.

44—NYLON INSULATOR goes on fast, easily

This nylon splice-cap insulator features ease, speed and simplicity of installation, it is announced, and provides excellent electrical and mechanical protection to spliced joints. Its snap-on-lock design is said to assure factory perfect insulation of wire splices and makes it easy to



install, even on flexible wires and in extremely hot or cold weather. Construction eliminates threading, wrapping, or twisting of insulator during installation and possibility of loosening in service, company points out—even under extreme vibration. Translucent nylon body permits inspection of completed splice. Insulators are available in two sizes for use with company's splice caps which splice normal circuit wiring from two No. 18's through three No. 8's or two 6's. They are announced as UL approved for building wire to 600 v and in fixtures to 1000 v, in applications to 105 C. Buchanan Electrical Products Corp.

45—SPEED TRANSMISSION can act as separate motor drive

The Speed-Trol Variable Speed Transmission, it is announced, is now available as a separate motor drive. Through means of a flexible coupling and mounting shelf, any foot mounted motor can be coupled with the Speed-Trol. It can be supplied with separate mounted explosion proof motor for locations in hazardous areas as well as drip-proof and

Whatever the LIGHTING PROBLEM in front of you...

thousands of BENJAMIN Quality Lighting Systems assure you of a Superior Solution

1. "Explosion-Proof" Units
2. "Vapor-Tight" Incandescent
3. "Magna-Flo" Continuous Lines
4. "Lite-Line 40" Rows of Light
5. "Magna-Flo" w/27° Lamp Shielding
6. "RLM Dome" Reflectors
7. "Magna-Flo" w/Plastic Covers
8. "Elliptical Angle" Reflectors
9. "Steelite" Armor-Clad Units
10. "Magna-Flo" Individual Units
11. "Symmetrical Angle" Units
12. VOUL Units w/25% Uplight
13. All-white "Diffuser" Reflectors
14. "Sky-Glo" Translucent Ceilings
15. "Stock-Bin-Lite"
16. "Officer" Louvered Units
17. "Panel-Glo" Plastic Ceilings
18. "Varsity" Low-Cost Fluorescent
19. "RD" Projectors
20. "Vapolets" Vapor-Tight Units
21. "Duo-Service" Floodlights

Superior Solutions to lighting problems require the *precisely right lighting system* for the seeing task and environment, plus *quality lighting units* built to deliver this lighting at lowest-per-year cost. With Benjamin you get both.

You get the precisely right lighting system, because Benjamin's line is so complete that thousands of different lighting systems can be created from it. You get lowest-per-year cost, because every Benjamin Unit has the quality and durability which 50 years of experience has proved to be essential.

Get a Superior Solution to your lighting problem! Start now by sending for FREE data bulletins on Benjamin Units for specific plant locations. Address:

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XR-986

For more facts circle 601 on Reply Card

Palletizing Costs Reduced

AS MUCH AS

80%

A Lamson Automatic Pallet Loader Palletizes Rice Chex At Ralston Purina Co., Battle Creek, Mich.

WITH A

LAMSON

AUTOMATIC PALLET LOADER

The First Automatic Pallet Loader . . . And Proven In The Field

A LAMSON SAVES TIME

Lamson . . . the original Automatic Pallet Loader, can palletize up to forty cartons per minute . . . from one to seven different product lines. The Lamson Pallet Loader palletizes at the highest proven capacity with minimum product damage. Cartons fed from one or more accumulator lines are stacked in almost any pre-determined interlocking pattern.

A LAMSON SAVES MAINTENANCE

Simplified design, employing proven type electrical circuits, makes any maintenance easy with ready access to all motors and working parts.

A LAMSON SAVES SPACE

Lamson Automatic Pallet Loaders will fit into almost any convenient plant area . . . there are no floor holes or special supports needed. Side by side installation is possible because cartons can be received from six different directions . . . empty pallets can also be loaded into one of three sides.

A LAMSON SAVES PRODUCT DAMAGE

The Lamson Automatic Pallet Loader produces stacking patterns more stable and uniform than those produced manually, with the least product damage . . . there is no hydraulic oil to smear cartons.

LAMSON AUTOMATIC PALLET LOADERS STACK 1,500,000 CARTONS EVERY 8-HOUR DAY IN:

OIL

Esso Standard Oil Company
Bayonne, N. J.
1 of 13 loaders in the oil industry

BREWERY

Anheuser-Busch, Inc.
St. Louis, Missouri
1 of 56 loaders in brewing industry

SOAP POWDER

Lever Bros. Company
Hammond, Ind.
1 of 9 loaders in soap powder industry

AND THESE INDUSTRIES:
Soft Drink • Floor Tile • Sugar • Chocolate Syrup • Shortening • Insulated Wire and others

WRITE TODAY for the free booklet which shows how you can save thousands of dollars yearly with the Lamson Automatic Pallet Loader.

LAMSON

Plants in Syracuse and San Francisco
Offices in Principal Cities

MAIL THIS COUPON TODAY!
Lamson Corporation,
3829 Lamson Street, Syracuse, New York
Gentlemen: Please send me a free copy of your booklet on Lamson Automatic Pallet Loaders. This entails no obligation, of course.
NAME ..... TITLE .....
COMPANY .....
ADDRESS .....
CITY ..... ZONE ..... STATE .....

For more facts circle 602 on Reply Card

NEW PRODUCTS

(Begins on page 148)

totally enclosed motors. The Speed-Trol itself embodies such features as fingertip control of speed change and positively displaced variable pitch pulleys, compact frame with rotating parts mounted between widely spaced bearings. Mounting dimensions for motors with integral gear reducers are interchangeable with those of the Slo-Speed Gear Motor itself. Sterling Electric Motors, Inc.

46—MAGNETIC DRUM is agitator type separator

This agitator drum is announced for the separation of small iron particles in reclamation of non-magnetic turnings, borings, chips, and similar processes where some agitation of the material is indicated for disentangling the iron and preventing excessive carry-over of material being reclaimed. The unit is composed of a ribbed stainless steel shell enclosing a stationary bank of high-powered Alnico V magnetic elements, around which the shell revolves. The units are available in 12- and 18-in. diam in widths from 10 through 38 in.

Installed at the discharge end of a gravity flow chute, spout or screw conveyor, the surface of the revolving shell receives the full flow of material, it is explained. Non-magnetic material is discharged first while the ferrous contamination is not released until it passes beyond the fixed magnetic field, when it drops into a separate container. The agitator drum is furnished in models with or without housings. Complete data on this agitator drum is given in Brochure B-606, Eriez Mfg. Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 215-216.

48—DIFFERENTIAL SCALE can weigh sticky stuff

Designed to weigh sticky and non-free flowing materials as accurately as dry aggregates, this differential scale automatically and continuously delivers a selected amount of material, the weight of which is the difference between a fully loaded and partially loaded scale. Called a weigh-in and weigh-out scale, this unit is made up of weigher, dial scale and totalizer. The weigher, consisting of a weigh hopper mounted on a short belt conveyor, is suspended from levers terminating in the dial scale. The belt conveyor provides a live bottom for the weigh hopper and facilitates discharge of hard-to-handle material.

Heart of the system is the electronic

COOLITE GLASS BRINGS COMFORT BY THE ACRE

Moscowitz, Willner & Millkey, Architect. J. A. Jones, Contractor.

Montag's New Paper Plant Keeps Bright and Comfortable Under 24,000 Sq. Ft. of Coolite

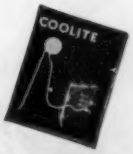
Montag, maker of fine stationery and school supplies for 65 years, recently occupied its new plant.

The Montag building covers 280,000 square feet and was designed to be the most modern stationery and school supply plant in the world. Conceived as an ideal plant for people and machines, it provides finest lighting, heating, humidity conditions and employee working and recreational facilities.

To achieve these aims, it is copiously daylighted with over 24,000 square feet of Coolite Glass by Mississippi. Coolite not only provides high levels of comfortable illumination, diffusing harsh sunlight for visual comfort . . . it absorbs much of the unwanted and uncomfortable solar heat rays, helps keep the vast interior cooler on brightest days.

Employees feel better, see better, work better under Coolite . . . for Coolite filters out unwanted harsh qualities of "raw sunlight" . . . permits extensive use of glass for low cost daylighting without undue heat.

In new construction or modernization, specify translucent light diffusing glass by Mississippi. Manufactured in a wide variety of patterns and surface finishes to help you solve any daylighting problem. See your nearby distributor of quality glass.



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WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

For more facts circle 603 on Reply Card

Norgren the most complete line of AIR LINE FILTERS

...to reduce corrosion, wear, upkeep costs of air equipment

...to prevent contamination of oil in Micro-Fog lubrication systems

73 MODELS...7 PIPE SIZES...3 TYPES OF FILTER ELEMENTS...3 TYPES OF BOWLS

AUTOMATIC-DRAIN AIR FILTER

¼", ⅜", ½". For pressures up to 150 psi.; temperatures up to 120° F. Filter elements: 74-, 64- or 25-micron. Replaceable, transparent bowl. Series 11,200.

SMALL, METAL BOWL AIR FILTER

for pressures up to 250 psi. ¼", ⅜". 74-micron filter element. Permanent bowl. For temperatures up to 300° F. Series 0-552 and 0-554.

AIR FILTER

for pressures up to 250 psi. ¼", ⅜", ½". Replaceable, metal bowl. Filter elements: 74-, 64- or 25-micron. For temperatures up to 300° F. Series 22N.

AIR FILTER

Permanent, metal bowl. ¾" to 1½" incl. 74-micron filter. For pressures up to 250 psi; temperatures up to 300° F. Series 560.

SMALL BOWL AIR FILTER

¼", ⅜". For pressures up to 150 psi, temperatures up to 120° F. Replaceable, transparent bowl. 74-, 64- or 25-micron filter element. Series 12,200.

AIR PURIFIER

for exceptionally thorough removal of moisture. 74-micron Wire Screen and Yarn filter elements. Replaceable, transparent or metal bowls. ¼". Series 21B and 21N.

AIR LINE FILTERS

for pressures up to 150 psi. ¼" to 1" incl. Replaceable, transparent bowl in two sizes. 74-, 64- or 25-micron filter element. For temperatures up to 120° F. Series 22B.

FILTER-REGULATOR UNIT

Automatically filters air and regulates air pressure. Replaceable, transparent or metal bowl. ¼", ⅜". Series 5A and 5N.

MORE THAN 700,000 Norgren Filters put to use by industry

LUBRO-CONTROL UNIT (Model 3745A-2) typical combination of Norgren Automatic-Drain Filter, Pressure Regulator and Micro-Fog Lubricator.

Phone the Norgren representative listed in telephone directory classified section under "Norgren Pneumatic Products" or

C. A. Norgren CO.
3443 So. Elati, Englewood, Colo.

WRITE FOR CATALOG

...shows latest developments in filters with data on Norgren's *complete line* of oil-fog lubricators, pressure regulators, valves, hose assemblies.

For more facts circle 604 on Reply Card

NEW PRODUCTS

(Begins on page 148)

controls which govern the differential weighing process and conversion of weight from analog to digital indication. Features of the belt conveyor include a scraper on the underside to keep material from building up on the belt, a regulator device that adjusts the depth of the material on the belt, and adjustments for tension and take-up. Richardson Scale Co.

49—BUTTERFLY VALVE, of stress sealed design

Developed to meet rigorous tolerance of permissible leakage in the closed position under high pressure and high temperature conditions, this stress sealed butterfly valve is 36-in. pipe size, of mild steel, with 125 lb American Standard flanges. The steel disc has a stainless steel seating edge. When rotated to the closed position, this disc seats against an Inconel-X band in the valve body. This band is then inflated under nitrogen pressure for essentially tight shut-off at operating temperatures to 800 F. Manufacturer says the valve has been tested to a leakage not exceeding 0.005 lb of air per second, with a 10 lb differential across the disc.

Said to be a major factor in minimizing or eliminating leakage is the off-set shaft design, which permits 360-deg sealing surface of the disc without necessity of the shaft going through the stress seal band. The valve is operated by a hydromotor driven by oil at 300 psi. Limit switches indicate full open and closed positions. W. S. Rockwell Co.

50—SINK TRAPS are made of polyethylene

These polyethylene sink traps offer several advantages in laboratories and other industrial applications where the disposal of chemicals poses a problem, according to manufacturer. The polyethylene material is claimed chemically inert, virtually unbreakable and easily cleaned and installed. The traps come in one size to fit standard connections. American Agile Corp.

51—UNIT HEATERS are gas-fired ceiling type

This ceiling suspended, downward discharge heater is announced as a complete self-contained heating unit, combining gas burners, combustion chamber and heat exchanger with motor driven fan and fixed or revolving discharge outlets. Combustion chamber and heat exchanger are of 16 gage aluminized steel, welded into a one-piece assembly. Burners are heavy wall cast iron with drilled ports. A built-in draft diverter is incorporated for proper burner operation under abnormal conditions of back draft. Automatic safety controls are provided. The first size in the present line has an input

WATERSPHERE

Selected for MoPar Parts Plant

200,000-gallon Watersphere at Chrysler Corporation MoPar plant Centerline, Michigan

● The Chrysler Corporation recently installed a 200,000-gallon Horton Watersphere® and two 150,000-gallon Horton suction tanks at their MoPar parts plant in Centerline, Michigan. The Watersphere provides a dependable gravity water pressure for general service and fire protection. The suction tanks are connected, through a fire pump, to an automatic sprinkler system and provide the secondary water supply.

● Is your plant protected from the ravages of fire? If not, it should be! Write our nearest office for estimates or quotations on a Horton elevated tank, Watersphere or suction tank.

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. . . a few highlights

Hydraulic fluids	
Safety hydrolubes	← To prevent fires where hydraulic lines are located near sources of ignition.
Gear lubricants	
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Low-temperature lubricants	
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High-temperature lubricants	← Burn off clean, are non-carbonizing.
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CARBIDE AND CARBON CHEMICALS

For more facts circle 606 on Reply Card

NEW PRODUCTS

(Begins on page 148)

capacity of 430,000 Btu per hr.

Heaters have discharge outlets to suit the installation requirements of ceiling height and floor area. Revolving discharge outlets send the heat downward in a gently moving air stream that covers entire working area, says manufacturer. This same circular motion provides cooling in summer. Fixed discharges are also available. L. J. Wing Mfg. Co.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

52—RIDER TRUCKS are low-lift type for pallets, skids

This line of low-lift rider trucks in capacities up to 4000 lb are announced in both pallet type, for handling single face or double face pallets, and platform type for skid platforms. With a top speed of 4.5 mph, they permit quick and easy transporting of loads and are said to be ideal for order selection work. The operator is fully protected by a solid reinforced sheet steel backrest and has all controls at finger-tip location. Models have three speeds forward and reverse with dynamic braking. To stop truck when going forward, it is not necessary to use footbrake; operator simply puts controller into 1st speed reverse. The pallet model comes in 6 lengths—32 to 60 in. and in 3 widths—25, 27, 30 in. The platform model comes in 7 lengths—30 to 72 in. and 2 widths—18 and 25 in. Lift is 4 in. Lewis-Shepard Products, Inc.

53—TOOL bores and turns tapered, straight edges

Taper Champ tapers in either direction and is described as rigid, accurate and dependable. It is used on jig borers, boring mills, and for blanking, piercing dies, drop forge dies, patterns and other operations. Feed screw and worm are tool steel, journal bearings are bronze bushed, and worm gear cut from gear bronze. Bronze gibs are provided for instant take-up when wear develops. Rapid traverse of slide is provided in both directions through rack and pinion. Shanks are interchangeable so the tool may be used in several different machines, it is noted, and the tool may be operated vertically or horizontally. Chandler Tool Co.

54—CONDENSATION UNITS with larger size tanks

Type HR Apco-Matic Condensation Return Units, equipped with larger receiver tanks for use where additional condensate storage is desired, are designed for use with heating systems having ratings from

50 Years have changed a lot of things!

...including DUST CONTROL

Cutaway view—
DAY "AC" Dust Filter

MINNESOTA MINING ABRASIVE DUST RECLAIMED WITH 99.99+% EFFICIENCY

This near perfect product recovery is but one of the many advantages offered by DAY "AC" Filters. For the most modern dust filtering be sure to investigate the advantages found only with the DAY "AC" Dust Filter. Bulletin 528R gives you complete facts. Write toDAY for your copy.

Man's accomplishments in all fields in the past 50 years are nothing short of spectacular. Compare the 12 second flight by the Wright Brothers in 1903 with the 3 hour and 46 minute *non-stop* transcontinental flight made March 9th, 1955. Striking progress in dust control equipment has also been made. When measured against the modern DAY High Pressure Reverse Jet Dust Filter, "rapping" or "shaking" type filters are simply out-of-date.

The DAY "AC" Dust Filter, made under DAY and Hersey patents, is the *modern* filter to match *modern* methods. It handles up to *five* times more dust laden air per square foot of cloth area than out-moded conventional type filters. At the same time this modern DAY Filter requires one-third less plant space.

DAY "AC" filter tubes are cleaned *automatically* and *continuously*. Self-adjusting cleaning rings clean the filter tubes and dislodge trapped dust, using high pressure reverse jet air. This cleaning method improves filtering effectiveness and lengthens filter tube life.

EVIDENCE OF DAY "AC" DUST FILTER EFFICIENCY is proven by the fact that 87% of our filter production is for reorders from users. For detailed information about the modern DAY "AC" Dust Filter write toDAY for your copy of Bulletin 528-R.

The DAY *Company*

807 Third Avenue N. E., Minneapolis 13, Minnesota

IN CANADA: P. O. Box 70G Fort William, Ontario
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STOP AIR POLLUTION with DAY DUST CONTROL

For more facts circle 607 on Reply Card

you save engineering time

with complete hanger assemblies

To save many hours of engineering time and to speed up your specifications, use Blaw-Knox overhead roller assemblies, rigid hanger assemblies, functional spring hangers with the patented *internal swivel action*, constant support spring hangers and vibration eliminators.

Each is a complete unit, designed for a specific purpose. Constructed to comply with the "code for pressure piping." Available in types and sizes to meet varying conditions.

And each is ready to install, which eliminates expensive cutting, threading and assembling in the field.

Our experienced engineers are available to both design and make recommendations for your hanger requirements.

Write for your copy of Bulletin No. 54 to get complete information

BLAW-KNOX COMPANY
Power Piping and Sprinkler Division
Pittsburgh 33, Pennsylvania

BLAW-KNOX

PIPE HANGERS

Complete line of functional spring hangers • constant support spring hangers • rigid hanger assemblies • overhead roller assemblies • supports • vibration eliminators . . . plus complete prefabricated piping systems for all pressures and temperatures

For more facts circle 608 on Reply Card

NEW PRODUCTS

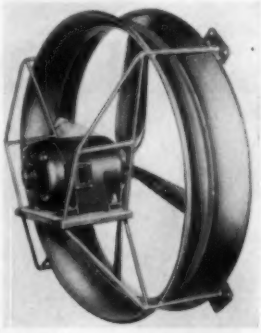
(Begins on page 148)

800 to 10,000 E.D.R. and pressures to 80 psi. Units come in both simplex (single pump) and duplex (twin pump) models; the latter are designed to return condensate to two boilers or, when connected to a single boiler, to provide built-in standby facilities. Both models are automatic in operation. The vertical turbine type pump design provides quiet operation and dependable performance, it is pointed out, and the pumping unit is bronze for long life and resistance to corrosion.

Receiver is cast iron, with extra heavy walls. Despite its 25-gal capacity, the return opening of this tank is only 16 in. from floor, permitting easy connection to low return lines. Duplex models can be furnished with a mechanical alternator which normally operates pumps alternately. Aurora Pump Div., New York Air Brake Co.

55—REVERSIBLE FAN is double ring type

This double ring reversible fan is designed for ventilating jobs requiring intake during some periods and exhaust



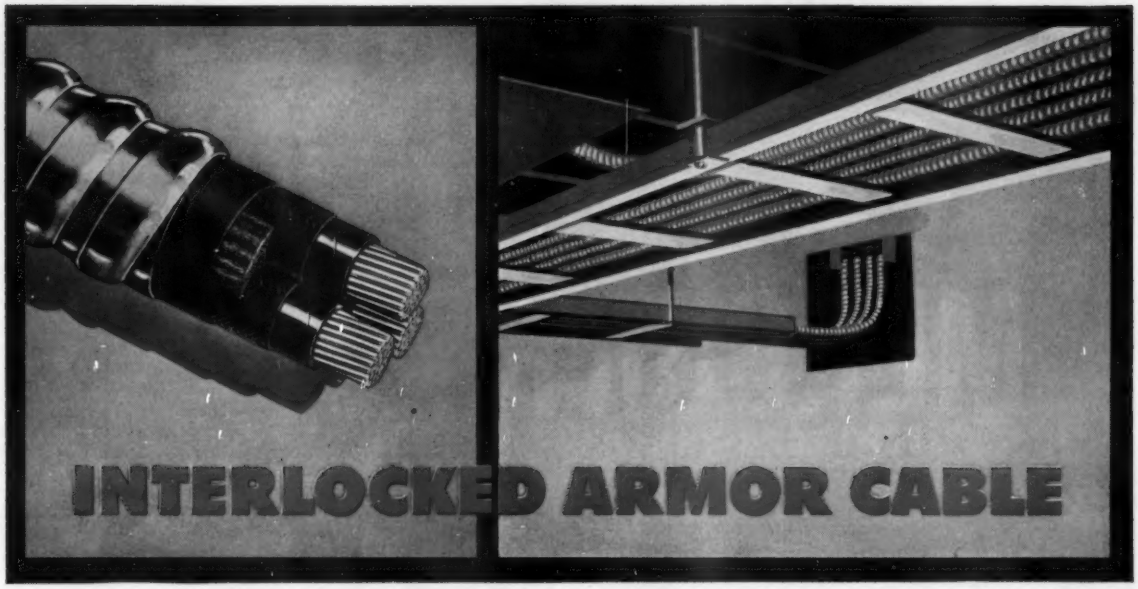
during others. It consists of an aluminum alloy reversible propeller and two curved orifices welded face-to-face. The fan is available in direct connected, belt drive, pulley drive, and extension shaft models available in 28, 36 and 44 in. diameters. Hartzell Propeller Fan Co.

56—DRAFTING DESK lets you work in comfort

With the Draft-A-Matic you can perform all drafting operations in a seated position. It is designed to bring any part of the drawing to the man—rather than have him stand or stretch to work on the upper portion of his drawing. The drafting platform has an endless vinyl plastic belt, which is 48-in. wide and can accommodate a drawing 72 in. long. The belt is moved by aluminum rollers, one at the front and one at the back of the drafting platform. By turning a wheel on the front roller, you move the belt and the drawing affixed to it, so that any part of the drawing is brought within range of visibility. Manufacturer says the plastic belt is wrinkle free and has a self-healing char-

GENERAL CABLE

THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE



Where extraordinary mechanical protection is required, any type of cable can be armored. General Cable offers this complete range of interlocked armor types:

Armor: copper, aluminum, bronze and steel. **Insulation:** varnished cambric, rubber and thermoplastic.

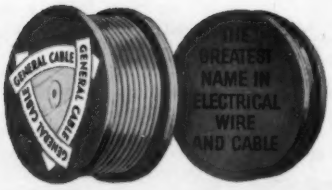
THE RESULT: a lightweight, flexible Interlocked Armor Cable that is ideal for wiring in close areas...under, down and around beams and pillars...where power needs vary...where plant layout presents space difficulties. Right angle bends, long runs and close quarter installations are easier to make and cost less than conventional cable and conduit.

To cut installation time and cost in new construction or old...Interlocked Armor Cable is used for primary or secondary feeders, and for connecting low-voltage plug-in bus and power utilization equipment.

From conductor to armor...General Cable offers you the ultimate in proven-in-use power and control cables...QUALITY that pays off in DEPENDABILITY, SAFETY, and EXTRA LONG LIFE.

Next time you are faced with a wiring problem that entails the need for mechanical protection ...look to General Cable for the simplest, most economical answer. And, remember, General Cable is the *only* manufacturer who can supply *all* your electrical wire and cable needs!

GENERAL CABLE
CORPORATION



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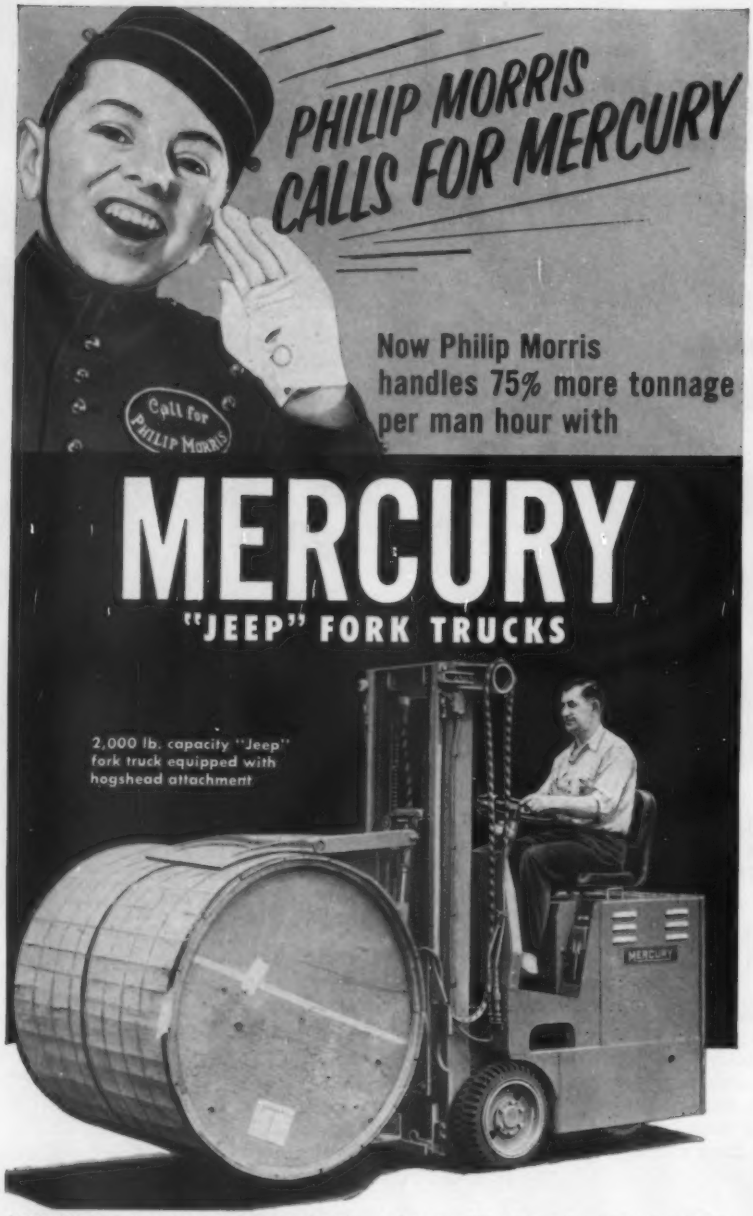

MERCURY "Jeep" Fork Trucks equipped with special hogshead attachments now handle four times as many tobacco hogsheads per man-hour than originally handled. This new method permits double tiering in freight cars . . . virtually eliminates damage to hogsheads.

MERCURY fork trucks (all types and capacities) are constantly solving difficult handling problems in all industries . . . effecting savings that amortize initial cost of equipment in record time.

MERCURY "Fork Truck — Trackless Train" Systems are recognized industry-wide as the most economical and effective method of moving and stacking material.

CALL FOR MERCURY (as Philip Morris and many other nationally known companies have) . . . our engineers will show you, too, how to save time and money in vertical stacking and horizontal handling.

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Mercury Manufacturing Company, 4002 South Halsted Street, Chicago 9, Illinois
For more facts circle 610 on Reply Card

NEW PRODUCTS

(Begins on page 148)

acteristic which prevents pencil grooves and holes. Adjustable in tilt from horizontal to 85 deg, the drafting platform accommodates current models of drafting machines, lamps or parallel straight edge. Incorporated in the desk below the drafting platform is an abundance of storage space, including an instrument drawer. In the back of the desk is a large storage area into which shelves and drawers may be installed. Legs on the Draft-A-Matic adjust to provide a desk height of 31 to 39 in. The General Fireproofing Co.

57—INDUSTRIAL TRUCK BATTERIES with high capacity

The HA66 and HB125 lines of industrial truck batteries feature company's Five-Fold Slyver-Clad construction, consisting of five separate layers of insulation which eliminate need for sediment space. By filling most of unneeded sediment space with longer and thicker plates, these batteries provide 10 per cent more capacity in standard size trays approved by Industrial Truck Manufacturers Specifications, company points out; in truck operation this means at least a 10 per cent longer duty cycle. C & D Batteries, Inc.

58—FOLDING STAND supports portable conveyors

Although designed primarily for use with company's Live-Rail Wheel Conveyors, this lightweight four-leg stand can be supplied for use with other types of wheel conveyors, roller gravity conveyors and other equipment requiring a strong, portable support. Of tubular construction, it folds flat (less than 3 in.) for convenient carrying, stacking and storage. It is adjustable, may be raised or lowered to desired height. The unit may also be supplied with casters—with or without brakes. The Alvey-Ferguson Co.

59—SUBMERSIBLE PUMP for vaults and sumps

This submersible pump for cable and transformer vaults, manholes, and other sumps is designed for dependable underwater service. Motor and pump are housed in a watertight case only 11⅛ in. high, so that entire unit is placed in sump. Water rising in sump, traps air in skirt of the switch, creating an air head. When water rises to predetermined height, air head flexes a diaphragm in the switch, closing the switch contacts and starting motor.

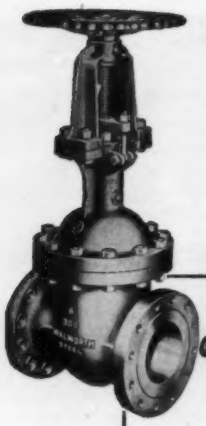
The pump can never be drowned out or flooded, manufacturer states, and if power failure occurs, motor cannot be damaged. Capacities range to 3,300 gph. A ⅓ hp motor drives the pump and is hermetically sealed in a case filled with insulating oil. Standard turn on head is about 9 in. from the floor. The pump shuts off when water is removed to within ⅝ in. from floor. Available in

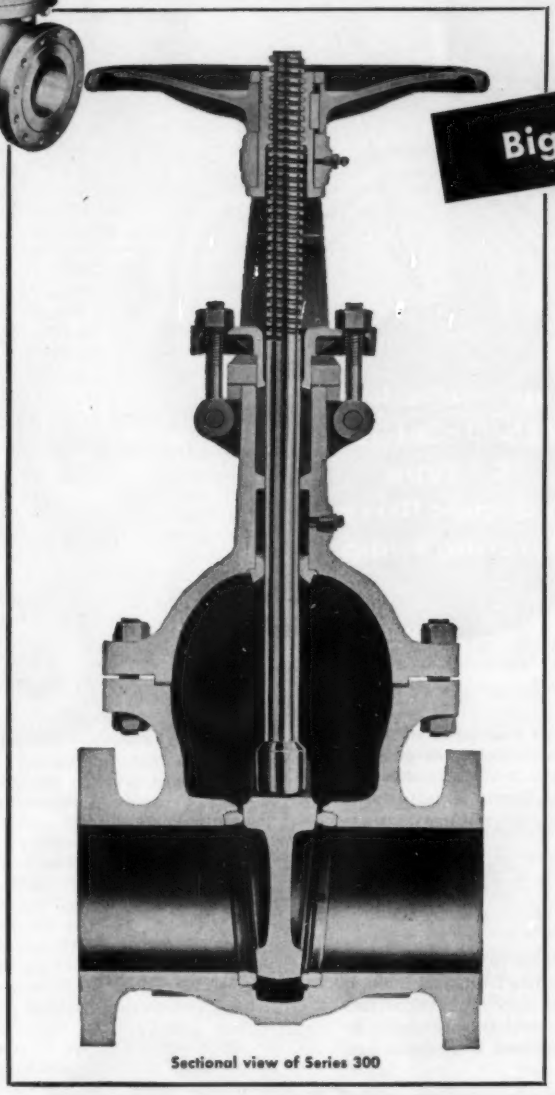
WALWORTH

Cast Steel Gate Valves

Series 150 and 300

Wedge Gate — Outside Screw and Yoke





Sectional view of Series 300

Big 8-Point Superiority!

Gland clearances are such that stem cannot be scored if gland should be tightened unevenly.

Deep Stuffing Boxes in all sizes (2" to 24") insure tightness and maximum packing life — costly leaks are eliminated.

Bonnets and Bodies are engineered to withstand pressure and minimize distortion — they're tough, durable, dependable.

Heavy Steel Walls provide extra strength and longer life.

Integral Body Guide Rib Faces are machined to insure accurate disc seating.

Seat Rings are bottom seated — not flange type. No recess exists at back of ring — hence no turbulence, erosion, or pressure drop.

Streamlined Ports allow high velocity, non-turbulent flow, and reduce the possibility of erosion.

Valves regularly have flanged ends. They can be supplied with ends for butt welding. Roller bearing yokes are available. On valves 5 inches and larger, by-passes can be furnished.

For Series 600 and higher, we recommend Walworth Pressure-Seal Steel Gate Valves.

For further information on Walworth Cast Steel Gate Valves, see your local Walworth distributor, or write:

WALWORTH

Manufacturers since 1842

valves • fittings • pipe wrenches

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DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

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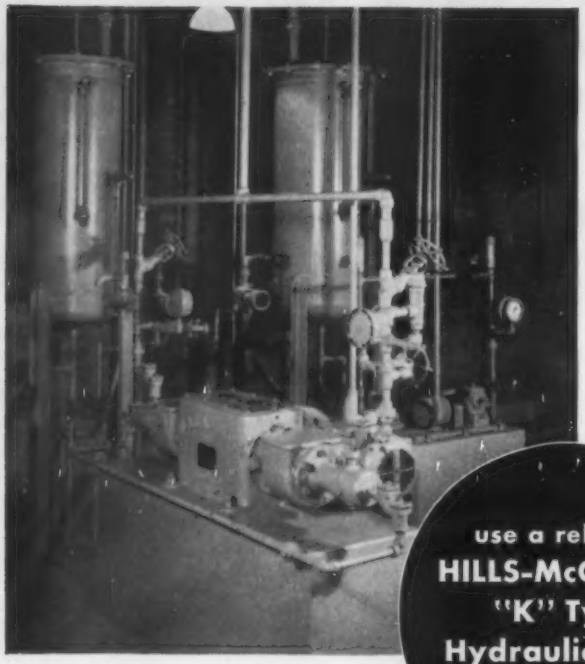
HERE'S HOW to take the headaches out of boiler feedwater treatment



use a reliable HILLS-McCANNA "K" Type Hydraulic Drive Metering Pump

Two-feed Type "K-3" pump handling phosphate in internal boiler water treatment.

Dependability is essential in your boiler feedwater treatment set-up. And the heart of the set-up is the pump used to meter the treatment.

The Hills-McCanna "K" Type Pump offers standards of accuracy, dependability and freedom from maintenance never possible before. The "K" Type Pump utilizes a unique hydraulic drive in which the drive parts operate in an oil bath. Stroke is adjustable while the pump is in operation; control is accurate; automatic pressure relief is built in.

Ordinary pump problems such as exposed linkage . . . linkage lubrication . . . atmospheric conditions . . . vertical type liquid ends . . . linkage and drive misalignment are eliminated by the "K" pump's fully enclosed, in-line construction.

Hills-McCanna "K" Type Pumps are available in two styles, the "K-2" with ¾ H.P. motor for maximum capacities from 2 to 135 gph per feed and the "K-3" with a 3 H.P. motor for maximum capacities from 1.6 to 730 gph per feed. The "K-2" develops pressures to 10,000 psi, the "K-3" to 30,000 psi. One and two feed units are available.

For further information ask for Bulletin KP-54 or send an outline of your requirements. HILLS-McCANNA CO., 2450 W. Nelson St., Chicago 18, Illinois.

HILLS-McCANNA

metering and proportioning pumps

Also Manufacturers of:
SAUNDERS TYPE DIAPHRAGM VALVES
FORCE FEED LUBRICATORS • LIGHT ALLOY CASTINGS

For more facts circle 612 on Reply Card

NEW PRODUCTS

(Begins on page 148)

115 and 230-v a-c in three models—109N for continuous or manual operation; 109A for automatic operation; and 109MA when manual starting is desired with automatic stopping. Kenco, Inc.

60—ANTI-RUST PAINT for low cost protection

Announced for low cost protection of exterior metal work, CI-88 incorporates a bituminous base with a special paint vehicle to produce a heavily bodied coating which can be applied on outside metal after a minimum of surface preparation. It is suggested for use on gutters, downspouts, stacks, flashings, railings, machinery, metal window sash, utility poles, tanks, metal fence posts. The manufacturer states that CI-88 dries to a semi-gloss finish and that it is intended for use as a finish coating and not as a primer. One application is said to be sufficient for most surfaces. This can be applied by brush, spray or dip methods. Chem Industrial Co.

61—SAFETY TREADS of extruded aluminum

Worn stairs can be leveled and made non-skid through the application of Stairmaster Safety Treads, it is claimed, and these extruded aluminum treads will also add beauty to the stairs. The safety treads come in a standard width to fit all stairs and are factory cut to length as required. They are drilled for easy installation. Wooster Products Inc.

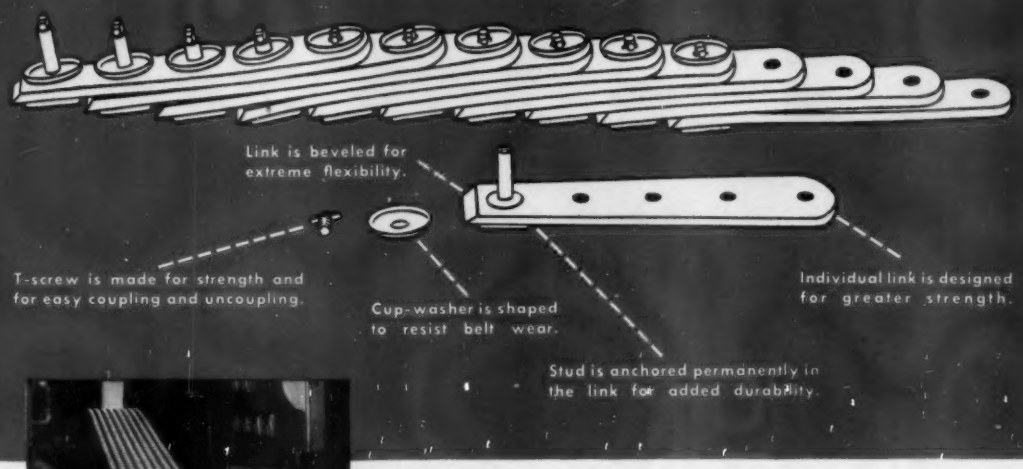
62—TRAFFIC CONTROLLER regulates package flow

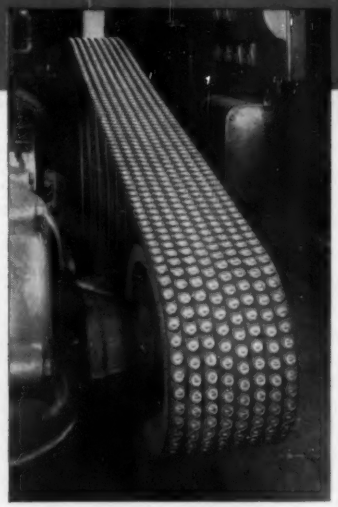
The Fergo Merger is announced as a self-contained, mechanical traffic controller that prevents jam-ups by guiding packages from two merging conveyor lines into a single forward moving line. It is easily set up where conveyor lines merge or where spur lines feed into a main line, and its two movable arms extend over conveyor lines. When a package on one side pushes one arm forward, the other arm is locked in its extended position, preventing passage of packages on that side. When packages have passed through, arm returns to its normal position allowing other arm to open and alternate line packages to go forward. Unit is available in various widths and sizes for application with various conveyor widths and package characteristics, and it can be set up permanently or temporarily to meet needs. Harry J. Ferguson Co.

63—FHP MOTOR for use on machine tools

This totally-enclosed fractional horsepower motor, for use on machine tools, is announced as factory lubricated for 10 years' service under normal machine tool conditions. Such lubrication is made possible by a special motor grease, company

This detailed line drawing of the new, patented Veelos TD and TE v-belt makes it easy to see how this new v-belt is designed to do a better job . . . easier!


Link is beveled for extreme flexibility.
T-screw is made for strength and for easy coupling and uncoupling.
Cup-washer is shaped to resist belt wear.
Stud is anchored permanently in the link for added durability.
Individual link is designed for greater strength.



New VEELOS

TD and TE Adjustable V-belt

So easy to couple *it installs in minutes*
So strong and durable *it lasts for years*

The new Veelos TD and TE adjustable v-belt is the successful development of a specific v-belt designed for a specific service—D and E drives.

This new Veelos TD and TE v-belt has these basic advantages . . .

It simplifies installation. Links are quickly joined by easy-to-use cup-washers and T-screws to make up individual belts. It's the easiest v-belt to couple and uncouple ever developed. And you don't need to waste time removing outboard bearings.

It lasts longer—is more flexible. New high-tensile strength link combined with new stud, cup-washer, and T-screw gives added durability. New link construction provides maximum flexibility for cooler, wear-resistant running.

Get the complete story of this great new v-belt for D and E drives. Send coupon now for new 8-page illustrated catalog.

VEELOS
THE LINK
V-BELT

Veelos is known as Veelink outside the United States.

MANHEIM MANUFACTURING & BELTING CO.
652 Manbel St., Manheim, Pa.

Please send copy of your new Veelos TD and TE v-belt catalog.

Name .....

Company .....

Address .....

.....

207

ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

For more facts circle 613 on Reply Card

Now! A packaged conveyor!

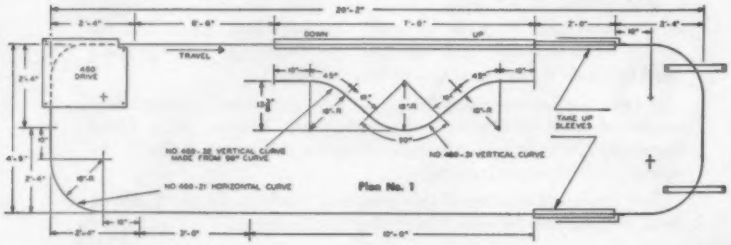
NEW **R-W "460" Continuous Power Chain Conveyor** requires no special installation engineering!

Richards-Wilcox' new "460" overhead conveyor can be installed without special engineering by your own plant personnel, quickly and easily, to meet *your* specific needs.

Completely packaged and shipped from stock, it offers economical and versatile light-load handling because of its lower load limits, flexibility, and easy installation.

R-W "460" is unequaled for jobs where the use of heavier conveyors is impractical. It is particularly recommended as a supplementary unit on production lines, and to help simplify and speed production where drying ovens, washers, paint sprayers, de-greasers and similar operations are involved.

R-W "460" is available up to 200-ft. maximum lengths *only*, with capacities of 8½ lbs. on 6-inch centers or 17 lbs. per lineal foot, and 200 lbs. draw-bar pull.



"460" Conveyors are shipped completely packaged, in convenient, easily-handled units, from stock throughout the U. S. Packages to fill any requirement up to 200-foot maximum length are immediately available from stock. For complete information and descriptive catalog, contact:

Diagram shows one of many different layouts possible with R-W "460" basic package. Up to maximum over-all length of 200 feet, variations are almost unlimited.

75 YEARS of QUALITY and SERVICE by RICHARDS-WILCOX AURORA, ILLINOIS

Richards-Wilcox Mfg. Co.
MATERIALS HANDLING DIVISION
Branches in Principal Cities

460 W. THIRD STREET, AURORA, ILL. SLIDING DOOR HANGERS & TRACK • FIRE DOORS & FIXTURES • GARAGE DOORS & EQUIPMENT • INDUSTRIAL CONVEYORS & CRANES • SCHOOL WARDROBES & PARTITIONS

For more facts circle 614 on Reply Card

NEW PRODUCTS

(Begins on page 148)

says, which is highly resistant to oxidation and moisture. Suited to plugging service and dirty atmospheres, motor is totally enclosed and fan cooled. Welded-on steel base and ball bearing design help protect motor against shock and vibration, and maintain accurate motor alignment. Built to meet demands for frequent start-stop service, this motor has normal torque for starting, high pull-up torque for inertia loads, and high breakdown torque for peak loads. In horsepower ratings of ¼, ⅓, ½, and ¾, the polyphase TEFC motor is available with speeds of 1725/1425 and 1140/950 rpm at 60/50 cycles, and in voltages of 208-220/440, 220/380, and 550. General Electric Co.

64—HOSE CLAMP goes on easily and quickly

This general purpose hose clamp can be fixed in place in 3 sec with an ordinary pincers, manufacturer announces, and lasting clamping action is assured under extreme internal hose pressure, hose movement and tough usage. The one-piece clamp is suggested for lines carrying compressed air, oxygen, hydrogen,

acetylene, insecticides, chemicals, water, steam, acids, gasoline, oil. The clamp is round with U-shaped folds or lugs. Smaller size models have two lugs and the larger ones three. You merely slip the clamp on the hose or part, and crimp it in place by squeezing the parallel sides of the lugs together with the pincers.

According to company, there is no danger of the pincers slipping. To remove the clamp, you snip off the lugs with the pincers. Initial low cost of the clamp makes replacement economical, it is stated. The clamp comes in ferrous and non-ferrous metals, in 20 sizes from ¼- to 2⅝-in. ID. Larger sizes can be produced. Circle Clamp Corp.

65—BUILDING GLASS in jewel like colors, textures

Spandrelite is a heat strengthened glass building product available in many colors. Although a true glass composition throughout, Spandrelite is strong, tough and remarkably shock resistant, according to manufacturer, for the heat-strengthening process which fuses ceramic color to the plate glass base gives

NEW! Heavy-duty relay in small space

This new CLARK Type "PM" Control Relay introduces a new concept in relay design: *Sectional Pole Construction.*

In this new relay, each pole is contained in its own melamine housing, and any individual pole can be removed or replaced from the front without disturbing the others. A short circuit is confined to a single pole and will not destroy the whole relay. Wiring terminals are on the front, and all maintenance including coil changing, pole or magnet replacement, is also from the front—without removing relay from panel. Contacts are quickly and easily convertible from normally open to normally closed and vice versa—from the front. Range of models provides relays with 2 to 12 poles. Exclusive design allows more contacts per square foot of panel space. In addition to the many advantages of SECTIONAL POLE CONSTRUCTION, you get a *heavy-duty relay in small space.*

For complete information write to

The CLARK CONTROLLER *Company*

Engineered Electrical Control

1146 East 152nd Street • • Cleveland 10, Ohio

SEE THIS NEW RELAY AT THE CLARK EXHIBIT, PRODUCTION ENGINEERING SHOW, BOOTH 840
Navy Pier, Chicago — September 6-16, 1955

For more facts circle 615 on Reply Card

The drive that set a ***NEW STANDARD*** *of*

PERFORMANCE

for Fork Lift Trucks

No other fork lift truck can match the smooth-power performance of a Towmotor with *TowmoTorque* Drive. There's no clutch to throw, no gears to shift. The exclusive *TowmoTorque Creep Control* allows full power for lifting while positioning the truck. "Forward" or "reverse" can be preselected *while truck is in motion* for fast getaway! And *TowmoTorque* lasts the lifetime of the truck with less maintenance than any other drive.

TowmoTorque is the only drive engineered for all fork lift truck operations. It is available in Towmotor Fork Lift Trucks exclusively. Get the facts from your nearby Towmotor Representative, or write TOWMOTOR CORPORATION, Div. 5809, 1226 E. 152nd St., Cleveland 10, Ohio.

TOWMOTOR
THE ONE-MAN-GANG®

FORK LIFT TRUCKS and TRACTORS
SINCE 1919

Manufactured Only By Towmotor Corporation—The Pioneer Maker Of Fork Lift Trucks

For more facts circle 616 on Reply Card

NEW PRODUCTS

(Begins on page 148)

the entire structure greater shock resistance than the usual plate glass of the same thickness. In addition to custom colors ranging from pastels to chartones, and textures from polished to tapestry, eight standard colors will be provided in a choice of polished plate glass or twill textures in opaque finishes. Special designs, insignia, spatter and mottled patterns are possible, it is claimed, as well as metallic and iridescent effects. In building construction, the color side is mounted to the interior. The product is described as non-porous, self cleaning, non-absorbent, stain and odor proof. Initial manufacture will be in panel sizes to 48-by-84 in. Pittsburgh Plate Glass Co.

66—LAMP BALLAST is smaller, lower priced

Besides being smaller in size and about a third lighter than company's previous models, this new rapid-start fluorescent lamp ballast is introduced at a substantial price reduction over the model it supersedes. According to company, it has a new core shape which achieves the required impedance with less wire and core material. This ballast (No. 89G465) is constructed in the narrow brickette cross-section while retaining the short length of the brick-type ballast. It has the same center mounting dimensions as the previous model. An additional lead has been added, however, so it can be connected directly to the lamps.

The new ballast is a high power factor model designed for use with two 40-w rapid start fluorescent lamps. Sound rated "B", for use in quiet installations, it has a circuit voltage of 110-125 v, minimum line power factor of 90 per cent, and line current of 0.85 amp. General Electric Co.

67—ALKALINE COMPOUND is multi-purpose cleaner

Du-Al 489 is said to remove rust, scale, paint, grease, and oil—in one operation. According to company, it is noncorrosive to sound ferrous metals and can be used as a soak or electrolytically with reverse or direct current. It can be used in a mild steel tank, it is noted, and is economical and long lasting. Manufacturer points out that its use eliminates the need for acid pickling in rust removal and eliminates possibility of hydrogen embrittlement. Chemclean Products Corp.

68—VALVE LUBRICANT has broad temperature range

This multi-purpose valve lubricant, the No. 555, is announced for a wide field of applications and temperature range. It is said to offer good metal-wetting qualities at both sub-zero and highly elevated temperatures and to be unusually resistant to mixtures of hydrocarbons in both acid and alkaline solutions. Claimed suitable for a wider range of services

Rolling Steel Doors

Manually, Mechanically, or Electrically Operated

MAHON CHAIN-GEAR OPERATOR

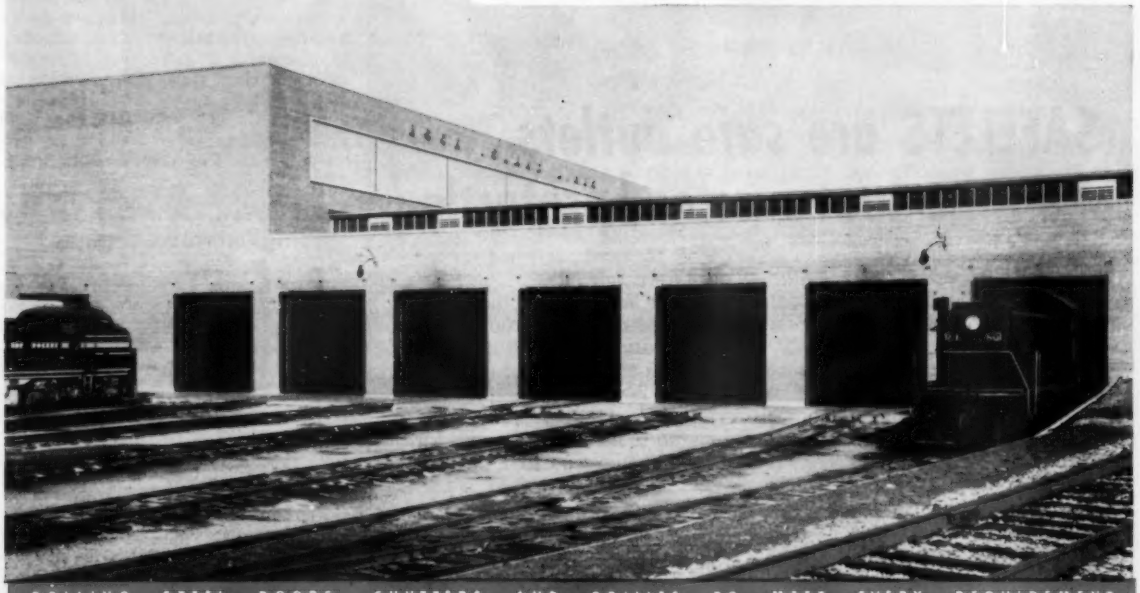
MAHON STANDARD POWER OPERATOR 920-P

For maximum protection, permanence, long life, and convenient, timesaving operation, most people, today, choose a good, power-operated rolling steel door. No other type of door can match their compactness in operation . . . the vertical roll-up action of the door curtain occupies no usable space either inside or outside the opening—and, there are no overhead tracks or other obstructions to interfere with material stacking or crane handling adjacent to door openings. A quick-opening, quick-closing Mahon power-operated Rolling Steel Door will save valuable time and valuable space in any type of opening. In addition, Mahon Rolling Steel Doors are permanent—their all-metal construction assures a lifetime of trouble-free service, and provides maximum protection against intrusion or fire . . . they require less maintenance, too, because, when the door is open, the interlocking steel curtain is rolled up above the opening safe from damage. When you select a Rolling Steel Door, check specifications carefully . . . you will find extra-value features in Mahon doors—for instance, the galvanized steel strip, from which the interlocking curtain slats are rolled, is Bonderized and dip-coated with synthetic enamel which is baked on at 350° F. prior to roll-forming. You will find other important Mahon features in both design and materials that add up to a greater over-all value. See Sweet's Files for complete information, or write for Mahon Catalog G-56.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales Engineering Offices in New York and Chicago • Representatives in Principal Cities

Manufacturers of Rolling Steel Doors, Grilles, and Automatic Closing Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Insulated Metal Walls and Wall Panels; Steel Deck for Roofs and Partitions; Permanent Floor Forms, and Electrified Cel-Beam Floor Systems.

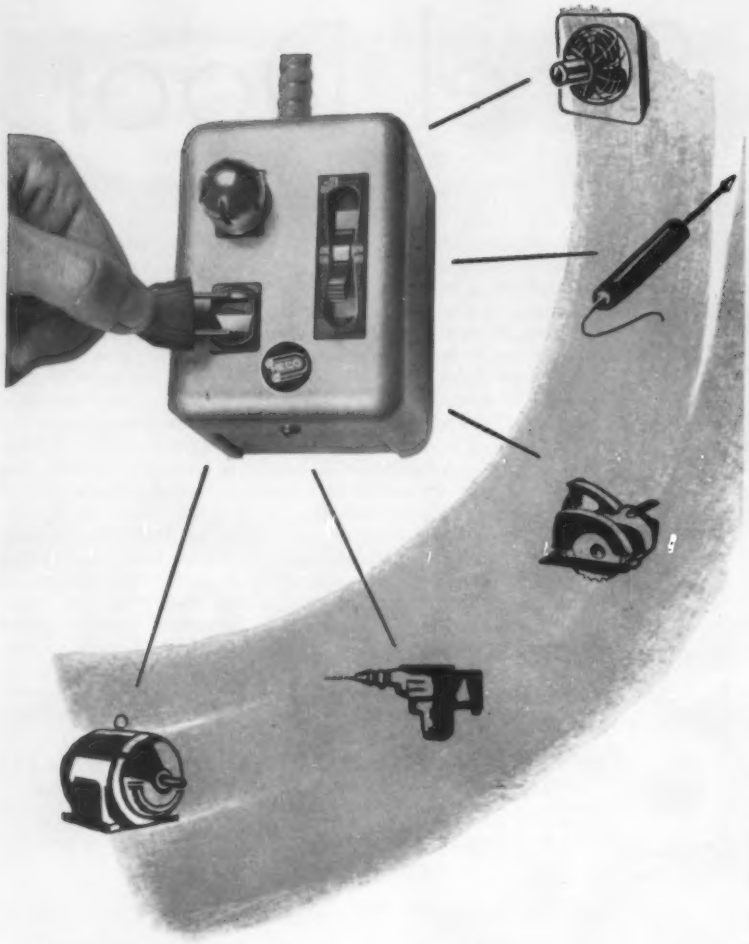


ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Eight Mahon Power Operated Rolling Steel Doors installed in track openings of a Diesel locomotive service shop. In addition to these, five Mahon Automatic Underwriters' Labeled Rolling Steel Fire Doors are installed in openings of interior walls. Rock Island Lines, Archts. and Engrs., S. N. Nielsen Co., Gen. Contrs.

MAHON

For more facts circle 617 on Reply Card



SAFELETS are *safe outlets* . . . for on-the-spot overload protection

Wherever electrical appliances or power tools are used . . . wherever the danger of overloading exists . . . there's need for a *Safelet*.

A unique individual protection station, the *Safelet* is another practical application of the Heinemann Circuit Breaker. It interrupts short circuits or large overloads instantly, yet allows normal inrush or harmless overloads. The circuit breaker is combined with a convenience outlet in an attractively styled metal wall-box.

Safelets protect either the branch circuit wiring or equipment plugged into the line. They are available in ratings up to 15 amperes, and, for protection of fractional horsepower motors, in ratings up to 1 hp. An optional feature is a pilot light which shows when the circuit is in use. Several types of female receptacles are available.

Safelets are safe outlets for power tools, soldering irons, exhaust fans, oil burners, air conditioners and miscellaneous small appliances. Installed in your plant, they can save many hours of down time, many dollars in equipment repair and replacement costs.

For details, write for Bulletin 1010.

HEINEMANN ELECTRIC COMPANY
128 Plum Street • Trenton 2, New Jersey

HEINEMANN Circuit breakers

For more facts circle 618 on Reply Card

NEW PRODUCTS

(Begins on page 148)

than many plug valve lubricants, the 555 replaces four other lubricants in company's line — Nos. 542, 546, 548 and 654. The new product has an efficient temperature range of — 40 to 500 F in bulk form, it is pointed out, and — 20 to 500 F in stick form. Company recommends it for hydrocarbon liquid and gas services — including gasoline, kerosene, fuel and lubricating oils, crude distillate, sweet or sour natural gas, LPG systems, dilute acids and alkalis, glycols, aquaeous solutions and water. Meter and Valve Div., Rockwell Mfg. Co.

Use the Reader Service Cards provided on pages 215-216 to ask for more information on these products. Circle item numbers of products in which you are interested.

69—HEAVY DUTY CASTERS are fully sealed units

This manufacturer's S99 series of heavy duty casters now incorporates complete sealing to prevent loss of lubricant and entry of foreign matter. Designed for hard service on power-pulled assembly line applications, the S99 is claimed to give full protection where dirt, debris, water or other foreign matter can present maintenance problems. Three new design features provide this protection, according to company: a baffle ring to protect swivel bearings from dirt and water, a grease retainer to prevent swivel lubricant loss through vertical leakage, and a wheel bearing seal to keep foreign matter out, grease inside. The Bassick Co.

70—POWER TAKE-OFF for the higher rated engines

Development of a heavy-duty friction power take-off for industrial engines in the 350 to 375 hp class operating in the 1800 rpm range is announced. Compact for its capacity, the Model SP-318 accommodates an SAE No. 0 flywheel. It has triple drive plate construction to provide ample friction surfaces to withstand excessive heat, and solid driving plate design to handle the stress of higher rpm. The pilot bearing of this power take-off is a single row of balls, operating in bearing races of double row width for improved accommodation of minor misalignment inherent with installations of this nature. Such pilot bearings provide additional space for lubricant which is more effectively retained by the double grease shield construction, it is explained; and although this construction is usually called "sealed for life" the clutch shaft is drilled to permit relubrication of pilot bearings.

Spherical bearings are another feature of this development. Manufacturer says

There's a big difference between initial cost and ultimate cost...

Especially when you're buying products like washroom towels

Don't ask or expect a purchasing agent to consider only *price per case* when choosing a brand of towels for company use.

A quality towel—the ScotTissue Towel—costs less in the long run

Consumption cost, *not* initial cost, is the true measure of towel price. The criterion is performance: how many towels are used in a week, a month—how many are used in a year?

Take ScotTissue Towels as an example. No towels at any price work harder for your money. They're strong, double-fold—won't come apart when wet—and *one* ScotTissue Towel dries both hands. Absorption is fast and complete . . . thus keeping daily consumption low and overall cost at a minimum. And remember ScotTissue Towels are so soft that many people use them as face cloths.

People prefer a quality towel—that's an important "plus"

In most homes—chances are in yours, too—Scott is the most popular brand by far. That's why it's natural for people to prefer ScotTissue Towels in company washrooms. It's quality they trust—a soft-to-the-touch paper towel they like.

Your local Scott representative or distributor stands ready to tell you more about ScotTissue Towels—and show you a simple consumption test you can make in your own company. Also, Scott offers a "Planned Poster Program" designed to promote washroom cleanliness. It's yours without cost or obligation. Simply write: Scott Washroom Advisory Service®, Scott Paper Company, Dept. PE-9, Chester, Pa.

It's good business to use

SCOTTISSUE® TOWELS

For more facts circle 619 on Reply Card

INCREASING TEXTILE PRODUCTION AND DECREASING COSTS AT RUSSELL MANUFACTURING CO., ALEXANDER CITY, ALA.

Advanced engineering methods of servicing over 64,000 spindles at the mills of Russell Mfg. Company have helped them to be recognized as one of the South's most enterprising textile mills. The continuous productive operation of textile machinery depends to a large extent upon keeping the equipment supplied with work materials. Keeping work material on hand and feeding it into the spinning machinery speedily is accomplished at Russell Mills with a combination of integrated trucks. And to assure these trucks a trouble-free, continuous cycle through every phase of mill operation, the Russell executives selected Faultless 504-4TG rigid plate and 1104-4TG Double Ball Bearing Swivel Casters with drawn steel wheels.

1100 Series SwivelCaster shown with Drawn Steel Wheel. Note two full rows of hardened ball bearings in swivel head and in wheel hub.

Faultless castered equipment can lead the way to reduced costs and increased production in *your own plant.* Casters for light, medium, heavy and special duties are included in the extensive Faultless line. Faultless wheels for every type floor and load, as well as for special temperature and chemical conditions, are available.

500 Series with Plaskite Wheel and Thread Guard to keep lint out of bearings, string from winding around axle.

Each month the solution to a real materials handling problem is fully presented in a free, handy size folder "Faultless Facts." Ask your local Faultless Distributor for copies or write to us, no obligation.

FAULTLESS CASTER CORPORATION
EVANSVILLE 7, IND.

FAULTLESS SOLVES THE TOUGH JOBS

For more facts circle 620 on Reply Card

NEW PRODUCTS

(Begins on page 148)

that because of its inherent ability to permit angularity, the spherical bearing is more resistant to overloads or destructive forces from heavy side loads, and is thus self-aligning. The Model SP-318 is scheduled as the forerunner of a new line of power take-offs. Currently available is a smaller model, the SP-314, for engines in the 225 hp range operating at 2200 rpm. Twin-Disc Clutch Co.

71—CAST IRON ALLOYS offer improved performance

Rezistan Irons are cast iron alloys in the chrome, nickel, copper, molybdenum and aluminum combination. The area of compositions which the patent for these alloys covers is said to permit varying their properties within wide limits. The new series is claimed to offer a combination of high tensile strengths, impact strengths and wear resistance, together with improved corrosion resistance particularly against certain atmospheric conditions, dilute acids and other chemical corrodents. It is stated that Rezistan Irons' improved tensile and impact strengths allow for reduction of the weight of the castings without detriment to constructional strengths. Among applications announced for the new alloys are castings for the chemical, oil, paper and pulp industries, production of pumps, compressors, valves, etc., and wherever improved corrosion protection is required. Uniworld Research Corp.

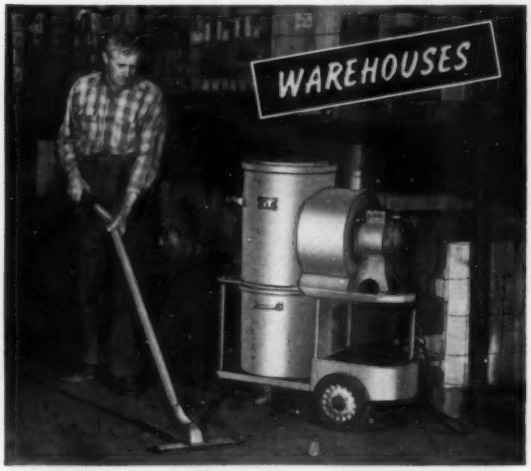
72—VALVE OPERATOR is electro-hydraulic unit

Self contained, this electro-hydraulic control valve operator is designed to eliminate need for air supply and compressor systems to operate controllers for process variables such as pressure, temperature and flow. An addition to company's electronic process control instruments, it makes available an integrated graphic-type process control system operated by electrical power. Such a system is reported especially desirable where long transmission distances are involved, where freezing or clogging of pneumatic tubing may be a problem, and where the cost of air supply systems is excessive.

Designed to position conventional slip-stem control valves, this operator uses hydraulic force developed by a self-contained pumping unit supplied by 115- or 230-v electrical power. The operator accepts the 0.5 to 5.0 ma d-c signal of company's American-Microsen transmission and control systems. Under proper conditions, the transmitter can be separated 30 miles from controls and control valve operator. Signals received by the latter may include proportioning, reset and rate actions.

Another product, an electro-hydraulic controller-operator, is a modification of the control valve operator using the same principles and incorporating proportional

INVINCIBLES
clean everywhere . . .



Regardless of the type of your business, Invincible Vacuum Cleaners remove all the dust and dirt fast and efficiently. Invincibles help keep your entire facilities—office, warehouse, research building, factory—cleaner, safer, more healthful and productive. Invincibles can also save you time and money by reclaiming or removing scores of industrial materials other than dust and dirt. Invincibles have been cleaning for industry more than 50 years. They're built for tough, trouble-free service; over 100,000 Invincibles are in use—5,000 for over 25 years. Let Invincible clean up your problem.

Send for illustrated Booklet which tells about Invincibles at work for industry.

For more facts circle 621 on Reply Card

MANZEL

FORCE FEED LUBRICATORS

COST LESS...

than doing without them!

Pressure Application — Exact Amounts — Accurately Timed

* Manzel Force Feed Lubricators quickly save their cost by preventing breakdowns due to faulty or forgotten lubrication — by reducing the quantity of lubricants used — and by eliminating the labor of hand oiling. They keep vital parts properly lubricated for uninterrupted production efficiency round the clock.

You can have Manzel Force Feed Lubricators installed on present equipment or engineered into new machinery. Write for information.

Manzel

Professionally qualified engineering representatives throughout the country.

DIVISION OF

HOUDAILLE-HERSHEY CORP.

301 BABCOCK ST., BUFFALO 10, N. Y.

For more facts circle 622 on Reply Card

NEW PRODUCTS

(Begins on page 148)

and reset control actions. It is operated directly from a transmitter and is used on local operations not requiring remote operating controls. Industrial Controls Div., Manning, Maxwell & Moore, Inc.

73—HAND TRUCK suitable for light duty work

Besides general warehouse and industrial use, Model A-209MD Hand Truck can be equipped with towline attachments for both overhead and under-floor conveyor lines. It has a capacity of 1500 lb. The deck and longitudinal channel sides are formed of 12-gage sheet steel with 2-in. channel iron (both longitudinal and transverse) providing intermediate support. Wheels are 8-by-2 in. metal base with demountable rubber tires, felt sealed bearings and one piece hub assembly. Tires have a steel base backing for easy replacement. Standard deck size of the truck is 32 in. wide by 72 in. long by 12 in. high. Mercury Mfg. Co.

74—INSTRUMENTS have snap-on plastic fronts

The Model 1331 line of flush rectangular instruments (3½ in.) incorporates a self-shielded movement designed to eliminate inter-effect when instruments are mounted closely on the same panel, and to permit mounting on magnetic or non-magnetic panels without special adjustment. The instruments have a one-piece snap-on front with zero corrector. Manufacturer says the entire front surface, except for the window area, can be supplied in any color, including black, for quantity built-in requirements. Case dimensions are 3.80 by 3.44 in. The line offers d-c and rectifier type a-c instruments in popular ranges. Weston Electrical Instrument Corp.

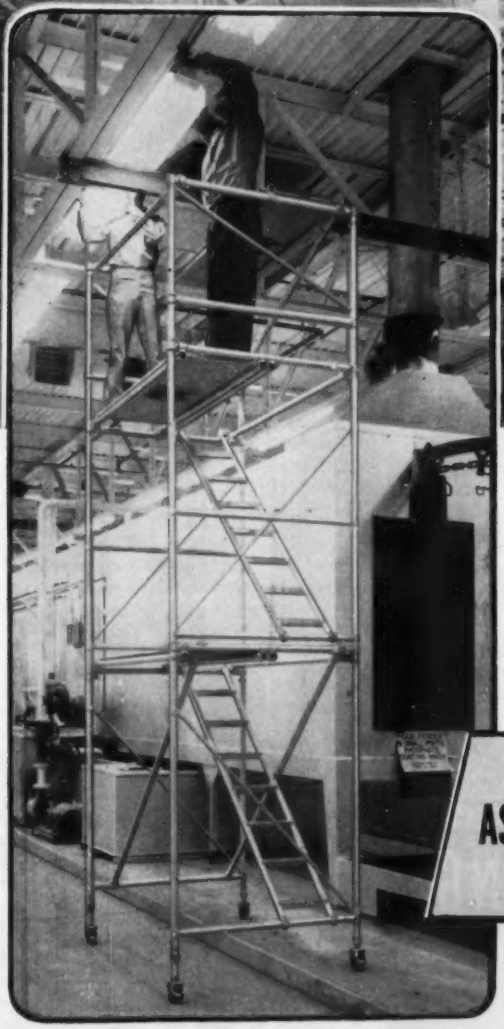
75—CONCRETE MATERIAL for flooring, construction

Laticrete "gives" without cracking under heavy loads, and dampens shock and noise, says manufacturer; it resists alkalis and mild acids, is waterproof and has a non-slip quality. The material is combination of liquid rubber and cement powder. The rubber content is said to make it extremely flexible and give the cured mix "bounce" and a tight bond that makes it resist breakdown.

This concrete-rubber mix is a surface coating and can be used for repair work or in new installations. It is reported to have good adhesion to concrete, metal and even glass. According to company, a ¼-in. layer of Laticrete (the suggested thickness) supports fork lift trucks when put down over a hard base. Laticrete comes in two parts — the powder and the liquid rubber—and is prepared like regular concrete with standard masonry equipment used to mix and apply it.

Manufacturer of Laticrete cautions that it must be applied to a clean sur-

45 acres of fixtures at new Ford plant maintained at lower cost with UP-RIGHT Scaffold-on-wheels



This ALUMINUM ALLOY scaffold provides the most economical and practical means to maintain overhead equipment in any plant, large or small. A tower of any height desired is ready in minutes. Individual 1-piece sections are unfolded and set one on top of the other. They lock into place instantly . . . no tools, wing nuts or bolts.

Your maintenance costs can be reduced by UP-RIGHT SCAFFOLD-ON-WHEELS.

17-FT. UP-RIGHT TOWER SCAFFOLD ASSEMBLED IN 2 MINUTES BY 2 MEN

Note leg adjustment for uneven floor.
Ford Plant, San Jose, California

• *Write for descriptive circular* •

"UP-RIGHT" SCAFFOLDS

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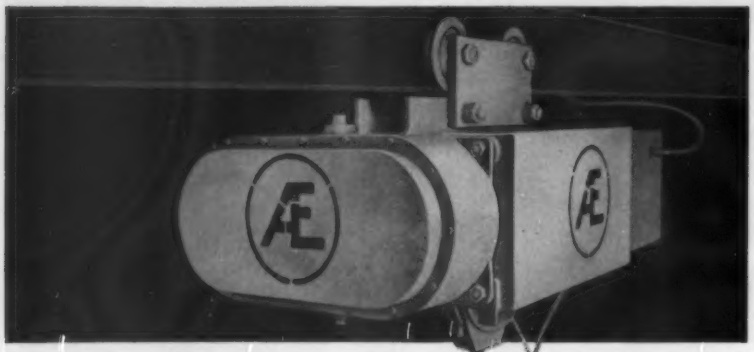
FACTORIES: BERKELEY, CALIF. AND TETERBORO, N. J. • OFFICES IN ALL PRINCIPAL CITIES

For more facts circle 623 on Reply Card

FOR ROCK-BOTTOM HANDLING COSTS...

STANDARD LO-HED



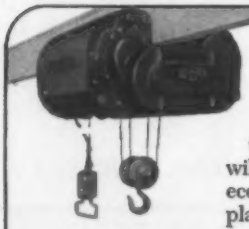
Truly a STANDARD hoist... ready for immediate delivery

LO HED

FOR A HOIST in the 2- and 3-ton range you'll get more for every dollar with AE's new heavy duty "Standard" Lo-Hed. This is a completely *modern* hoist; the last word in engineering and materials; quantity-produced; packed with extras at no extra cost.

"Standard" Lo-Hed's balanced design is tops for crane, monorail and stationary service... unmatched for simplicity and maintenance ease. Welded steel chassis combines rigidity and light weight. Straight line spur gear drive abolishes worm-wheels, extended shafts and split gear combinations. Lower limit safety switch is standard... no extra charge!

For economical materials handling, write for full information on the "Standard" Lo-Hed... or on the Customized Lo-Hed if you have special requirements. American Engineering Co., 2503 Aramingo Ave., Philadelphia 25, Pa.



FAMOUS CUSTOMIZED LO-HED

For lifts of more than 20 feet... for low headroom... for loads from ¼ ton to 12 tons... a Customized Lo-Hed Hoist will bring you the same speed, efficiency and economy that have cut handling costs in plants from coast to coast.

AMERICAN ENGINEERING

COMPANY

Philadelphia 25, Penna.

Affiliated Engineering Corporations, Ltd., Montreal 16, P. Q.
Bawden Industries Ltd., Toronto 3, Ont.

AE Products are: Marine Deck Auxiliaries, Hele-Shaw and Hydromite Fluid Power, Lo-Hed Hoists, Lo-Hed Car Pullers, Taylor and Perfect Spread Stokers.

For more facts circle 624 on Reply Card

NEW PRODUCTS

(Begins on page 148)

face, because dirt or foreign matter will prevent a bond. Also, any acid on the surface to be coated must be neutralized before application. The light gray mix can be pigmented in various colors. Naugatuck Chemical Div., United States Rubber Co.

76—PLUG-IN CAPACITORS for printed circuits

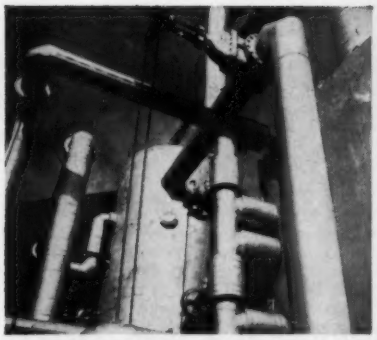
Type BC Capacitors are phenolic-cased plug-in paper tubular units for use with printed circuits. These capacitors are encased in molded phenolic shells with two parallel lead wire terminals. The latter are brought out from the end of the capacitor through a thermosetting plastic end fill compound, and are spaced a fixed distance so they may be plugged directly into printed circuits and dip soldered. Manufacturer reports that distortion and stresses inherent in pressure-molded assemblies are eliminated by inserting the capacitor section in a pre-molded, mineral-filled phenolic shell. The capacitor element, wound from aluminum foil and tissue, is sealed within the case by company's Polykane which bonds to the container wall and wire leads, barring moisture creepage, while holding the lead wires in place. Ratings and test data on these capacitors are provided in Bulletin 162. Cornell-Dubilier Electric Corp.

77—PAINT REMOVER—lets it rinse off with water

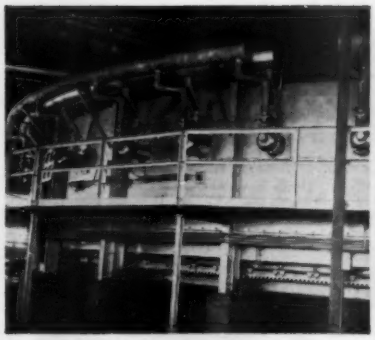
R.P.O. (Rinses Paint Off) is announced as a paint dissolver-remover which will dissolve paint, varnish or lacquer from any surface — right down to the raw metal, wood, concrete or brick — and without harm to the basic surface. Its action on paint is described as practically disintegrating. R. P. O., an alkaline viscous liquid, may be brushed, sprayed or poured on the surface from which paint is to be removed and allowed to remain from 10 to 30 min, depending on age, quality and thickness of the paint. The surface is then rinsed with a stream of water or wet sponge. Paint and remover flow away in the water solution, says company, and no scraping is required. Bulletin 6655 gives full details on R. P. O. Creative Chemical Co., Inc.

78—LIGHTING FIXTURE for illuminating chalkboards

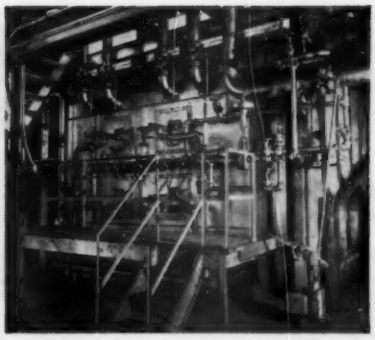
Although intended for schoolrooms, this new lighting fixture offers improved lighting for the blackboards used in industrial training classrooms. With it, the person writing on the board need not squint from glare or work at a dizzy angle to avoid his own shadow, it is stated. The fixture is designed to provide abundant light over the entire writing surface. It is available in 4-, 8- and 16-ft lengths in rapid and instant start. Sylvania Electric Products Inc.



Aluminum paint on light oil still (round tank in background), pipes and oil heat exchanger (right) has been in service more than two years.



Rotary hearth furnace of seamless tube mill, used to heat the billets, is completely painted with aluminum for cleanliness and longer life.



New East Mill boiler, burners, pipes, platform and bulkheads, painted with aluminum more than a year ago, are still bright and attractive.

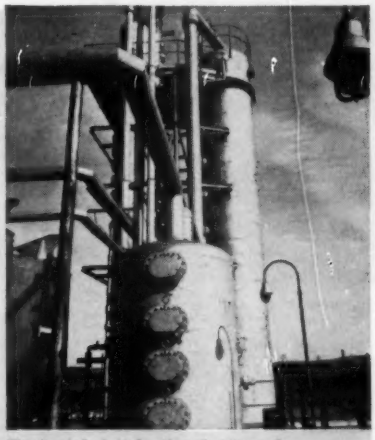
Colorado Fuel & Iron Corporation uses
ALUMINUM PAINT *in campaign to achieve*
"the cleanest steel mills in the United States"

The Colorado Fuel & Iron Corporation, Pueblo, Colorado, strives to maintain "the cleanest and safest steel mills in the United States," relies heavily on aluminum paint to do the job. The company makes extensive use of aluminum paint "because of its appearance, heat-resisting qualities, reflective characteristics and durability." (Only aluminum paint satisfies all of these requirements.)

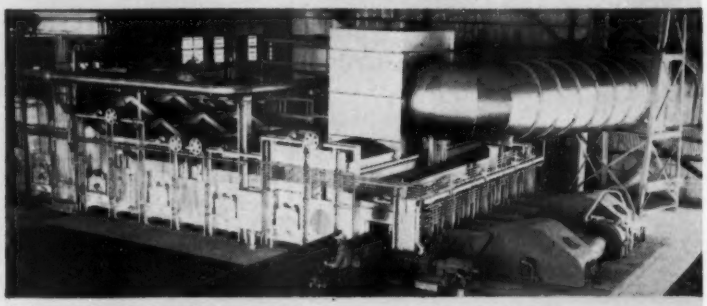
Aluminum paint is the most versatile . . . most popular paint in the maintenance market today. You see it everywhere . . . on storage tanks and smokestacks, fences, bridges, roofs . . . and especially on modern industrial operations like those at C.F.&I.

Alcoa does not make paint, but ALCOA Aluminum Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by your paint manufacturer to solve individual problems. Paints made to these formulas actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes.

Write today for more information on all types of aluminum paints. Use the coupon.



This benzol plant fractionating tower is protected by asphalt-base aluminum paint which has given excellent service for more than two years.



Preheating furnace at C.F.&I's new rod mill was spray-painted with aluminum in September, 1949. Furnace heats over 1,000 tons of steel a day.

ALCOA ALUMINUM
ALUMINUM COMPANY OF AMERICA

Paint Service Bureau, Aluminum Company of America
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For more facts circle 625 on Reply Card

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AT THE EXPOSITION YOU'LL SEE new ways to put power to work for greater productiveness and economy—a world of new, helpful information under one roof!

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Chicago Exposition of Power & Mechanical Engineering

Under the auspices of the ASME

Management: International Exposition Company
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For more facts circle 626 on Reply Card

Maintenance Costs— When Are They Excessive?

(Continued from page 93)

duction going since delivery of a new one is too long.

"I do not believe this system would be a value to us in our plant in deciding when to replace equipment.

"If you have machine records over a period of years, I believe it would be better to set a maintenance cost limit for each one by reviewing the past history. This limit would then be used as a flag for a clerk to use and call to the Maintenance Supervisor's attention that costs are rising and should be investigated. Thus I see that maintenance limits placed on a machine record card have value.

"I think the word 'Wear' in Wear Point etc. might be better if changed to 'Maintenance'. Wear factor just doesn't sound right to me and was a handicap in understanding the subject when really we are talking about maintenance. Thanks again for sending me this article. It has helped me in my work."

P. Bowman
Mechanical Superintendent
Seeger Refrigerator Company

Any Helpful System Deserves Attention

"IN ANSWER to your letter of May 10, 1955 asking for comments on Mr. Margo's 'Maintenance Costs - - - - -.'

"Briefly, I feel that any system which will help to analyze our problems on a scientific or factual basis deserves attention. Since the system in question requires the use of judgement I feel that great care must be taken by the administrators. By this I mean that some people easily become slaves to any system, hesitating to deviate from the established pattern. I suppose one calls this type of thing 'bureaucratic behavior.' However, if all people concerned are aware of the fact that the system is set up on a considered judgement basis and by virtue of this requiring deviation, it can be of value to the organization.

"There are undoubtedly many concerns where replacement due to excessive maintenance is relatively minor, speaking expressly at the moment about machine tools, and where obsolescence is the greatest single factor. In these cases I would suspect that MAPI would be of the greatest use.

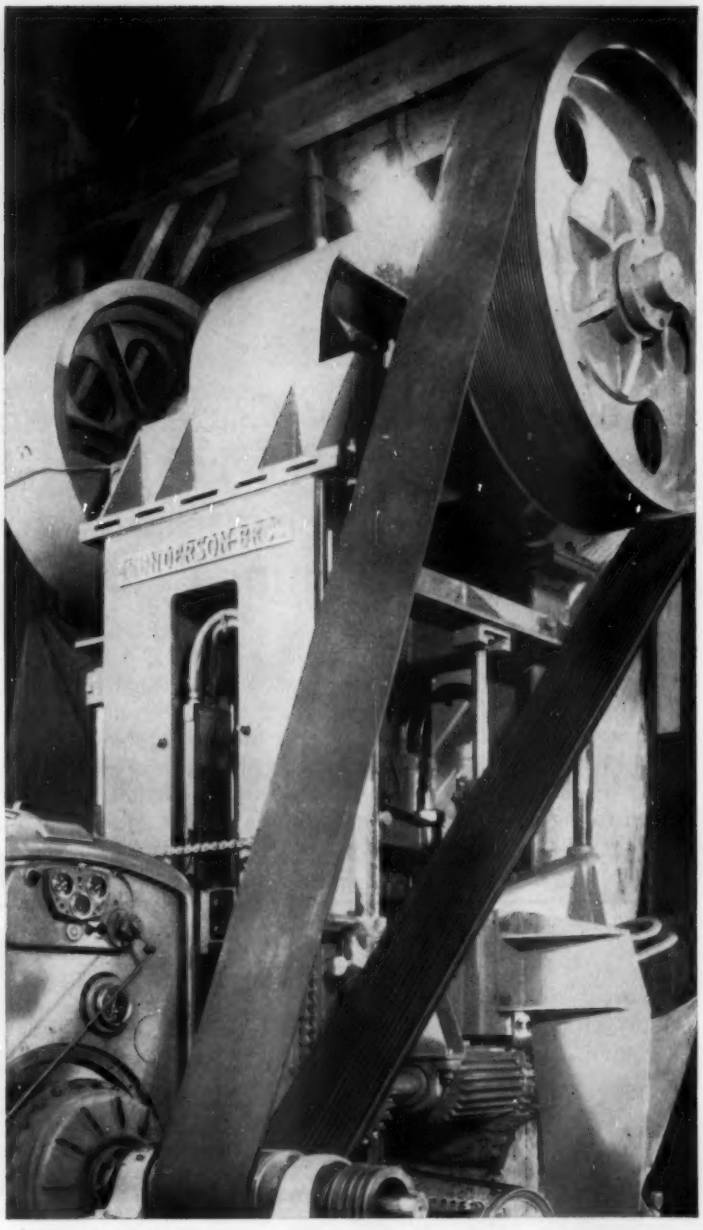
"Thus, where equipment records are available and where it can be set up and administered judiciously, it should prove to be a good tool.

"Without any experience, it would be difficult to suggest any concrete improvements. It would appear that one would have to jump in and get wet before he could intelligently be critical of the procedure as set up.

"There are a few points on which I could use some clarification:

a. Where does the split up of responsibilities enter into the picture? b. Would we still not be apt to get into heated arguments, over the assumptions in the latter case? c. In cases where there is excessive maintenance, might that not indicate a modification in design to whip the problem, especially where a more expensive tool is involved? d. Insofar as buildings are concerned, is it at all common practice to replace buildings because of maintenance costs or do we just make the necessary repairs as we go along? That is—repair or replace roof, repair or

New multi-ribbed neoprene belt gives high drive capacity . . . resists heat, oil, abrasion



Good grip and positive tracking are assured with this new transmission belt of neoprene, Du Pont's chemical rubber. V ribs prevent slipping on the sheaves . . . belt runs cool because of its greater surface area. And manufacturer of the belt claims a 30-50% increase in drive capacity over a multiple V-belt system of comparable width and eliminates matching problem.

Wear is even on the new belt, regardless of load and load changes. The V ribs fit evenly into the sheaves under all conditions; the drive ratio is unaffected. Because it's made with neoprene, this new belt resists abrasion, weathering, oil, grease —*all* causes of failure in ordinary rubber products. One of these new neoprene belts has already given a year's perfect service driving a stone crusher, despite severe shock loads, heat and contact with oils and grease.

This new belt helps reduce belt and sheave inventories through its unusual design. Because it is made of neoprene, it provides *extra-long service life* . . . keeps maintenance and replacement costs low. Be sure to ask your rubber-goods supplier about the many neoprene products now available.

REMEMBER, OF ALL RESILIENT MATERIALS, ONLY NEOPRENE HAS BALANCED RESISTANCE TO:

- Corrosive atmospheres
- Oils, solvents, most chemicals
- Sunlight and weathering
- Flex cracking and heat
- Abrasion, cutting, chipping

Oxidation and aging

NEOPRENE

The rubber made by Du Pont since 1932

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MAIL THIS COUPON TODAY!

FREE! THE NEOPRENE NOTEBOOK. Every issue contains interesting stories about products made with neoprene. Actual case histories give you the facts about neoprene's longer service life. Clip this coupon to get on the mailing list.

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In Hazardous or Coded Areas Specify RESOLITE FIRE-SNUF The Fiberglass Panels With Flame Spread Rating Below 75*

In buildings where fire hazards are severe or where codes require a flame spread rating below 75, you can now specify Resolite Fire-Snuf fiberglass-reinforced, translucent panels for plant daylighting.

Fire-Snuf panels are self-extinguishing—they will not, of their own accord, support combustion. Under the fire of a blow-torch (see below) they will burn, but they extinguish themselves almost immediately upon removal of the source of heat and flame. *Their flame spread rating of below 75 places them in a bracket equivalent to the Building Officials Conference of America classification of "slow burning" or "flame retardant."

FIRE-SNUF Blow-Torch Test

A blow-torch applied directly to edge of a Fire-Snuf panel slowly ignites resin and small flames appear. The blow-torch is turned aside and five seconds later (note stop watch) flames on the panel are self extinguished.

Fire-Snuf panels are not designed to replace standard Resolite, but, rather, to supplement it in critical areas. With permanent flame resistance chemically locked in, they retain all the best features of standard Resolite—shatterproof safety, strength, translucence, stability and load bearing characteristics.

Available at extra cost, Fire-Snuf is molded in flat panes for glazing and in all standard Resolite corrugations in lengths up to 13 feet and widths up to 42 inches. For additional information consult your distributor or contact . . .

RESOLITE Corp.
Box 517, Zelienople, Pa.
Office and Warehouse, CHICAGO, ILL.
Export Office, HOUSTON, TEXAS
Distributors in principal cities, U. S. and Canada

For more facts circle 628 on Reply Card

replace sash, tuckpoint, paint, replace sections of floor.

"In our case we analyze all maintenance costs which exceed $500.00 on any machine tool in any one year. Admittedly a much rougher tool than the one proposed.

"It would be interesting to have a round table discussion of this system at one of our Plant Engineers' meetings."

Otto J. Seidl
Plant Engineer
Combustion Engineering, Inc.

Would Have to Be Tested to Be Accepted

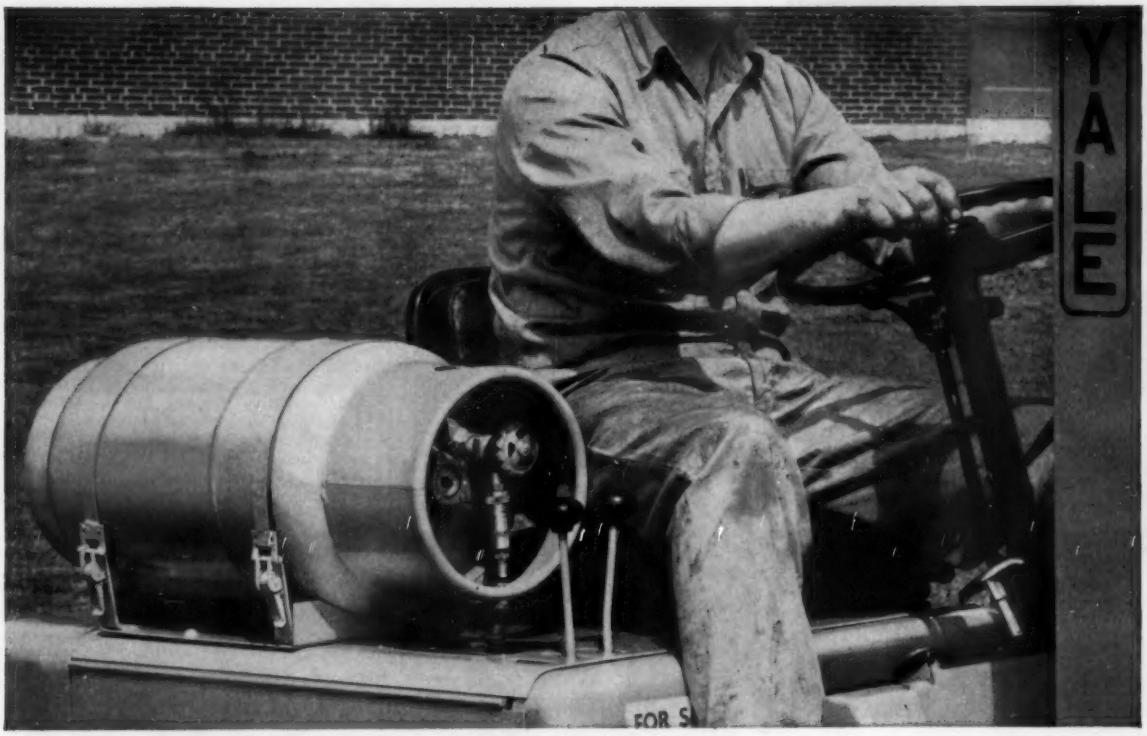
"THE ARTICLE you mailed to me for comments, 'Maintenance Costs' by B. A. Margo, was read (and then reread) with a great deal of interest.

"The profession of plant engineering contains the basically important function of—maintenance. In practice, the majority of plants operate on a 'rule-of-thumb' basis, with some semblance of systems, from plain guesswork to a system where complex rules and regulations are used. Ultimately a system will be developed whereby the science of maintenance, its principles, functions, and results, will be evaluated on a universal basis. At that time, a plant engineer will be able to go from one plant to another, within his own industry or even to another diversified industry, and take up the duties of plant engineering with a minimum amount of transitional period. When that day arrives, then the plant engineering profession will have reached its optimum point in American industry.

"The system proposed in the subject article is one of several I have become aware of (and of course there are many other systems proposed and in use). From the theoretical point of view, the system answers questions with good results. The factor of wear points on pieces of equipment—buildings and items in the services of a plant, is based on a personal evaluation. Even though the system is based on relative values, rather than absolute values, I doubt if in an average plant these values of wear points would balance out to give the same result, regardless of the person making the evaluations.

"To prove the value of the system would be to take an average manufacturing plant and set up the procedures as outlined in the article in an independent manner, by three plant engineers of different rates of experience. Let each of the three men have, say, one, 5 years; the second, 15; and the third, 25 years of plant engineering experience. Then judge the merits of the system by a comparison of the final results as arrived at by these three plant engineers of different viewpoints based on the matureness of their experience.

"It would also be most difficult, if not impossible, to set up this system in a plant that has an established accounting procedure and a financial policy as to capitalization, type of depreciation system, and a policy on expensing costs. (For that matter, any other system would have the same difficulty of being introduced under the same circumstances.) An existing system of evaluating needs of maintenance costs based on the judgment and experience of the department responsible for this function, and a system which brings in workable results within an established accounting procedure and financial policy, would not be readily, if at all, abolished in favor of a



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Now available in truck capacities from 2,000 to 10,000 lbs.

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Quick cold-weather starts. LP-Gas eliminates detonation, lugging and choking for smooth, quiet operation. No knocks or ping even with a 10/1 compression ratio.

More efficient while idling—when carbon forms most rapidly. LP-Gas enters cylinders as a vaporized gas, burns completely. This reduces engine wear from carbon deposits, sludge, cylinder and piston ring washing, crankcase oil dilution.

Downtime cut in half—cleaner engine runs twice as long without overhaul. Oil lasts 5 to 8 times longer.

No fumes or odor. Yale LP-Gas trucks can operate around sensitive foodstuffs, in deepfreezes, warehouses and enclosed areas with complete safety.

Factory-installed LP-Gas systems are available on all new Yale Gas Trucks. And *any* Yale Gas Truck you already own can be converted by factory-trained personnel. For more details, call a Yale Representative today.

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PIPE LINE FILTERS

FOR CLEAN, DRY AIR

Guard Against
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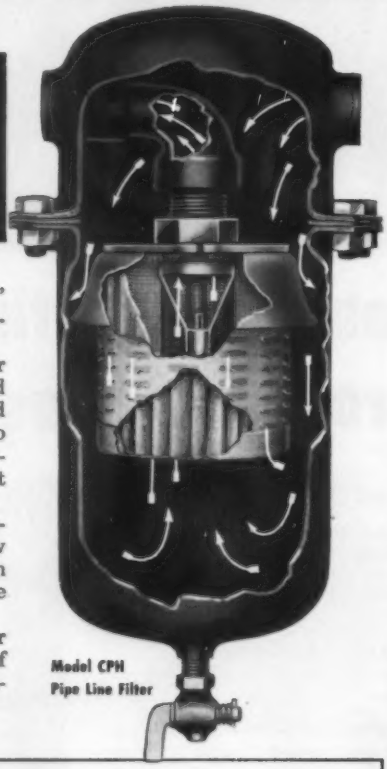
PIPE SCALE



Model CPH
Pipe Line Filter

Staynew's "double-action principle" assures sustained, trouble-free operation at high load factors.

1. Deflector cup directs flow of air or gas, together with water, oil and dirt, to the walls of the housing and then downward at high velocity into the base, where water, oil and heavier particles of rust, scale and dirt are deposited.
2. The air or gas having been mechanically cleaned, rises at low velocity through the Radial Fin Filtering Insert which removes the lighter air-borne material.

Efficient design eliminates need for frequent cleaning. Interior parts of filters are easily accessible for inspection and cleaning.

WRITE for Bulletin 200 containing photos, charts and engineering data. Our Engineering Department welcomes the opportunity to help solve your air filtration problems.

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ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

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system as proposed in the subject article.

"My comments as to the relative merits of the system, are of course limited because they are based on trying to mentally apply the functions to my plant, and under existing circumstances, advantages would not be realized. However, all factors being equal, it would be interesting to observe the results in a plant where three plant engineers (as mentioned before) would evaluate the wear points of all items requiring maintenance."

Name Withheld by Request
Plant Engineer

Formulas No Substitute For Judgement, Knowledge

"THANKS FOR your letter of May 10, 1955. In looking over the proposed article, I made a conscious effort to refrain from negative thinking but despite this, I ended up with the conclusion that your first thought as to its 'Formidable' character was correct.

"The following notes are presented for your information.

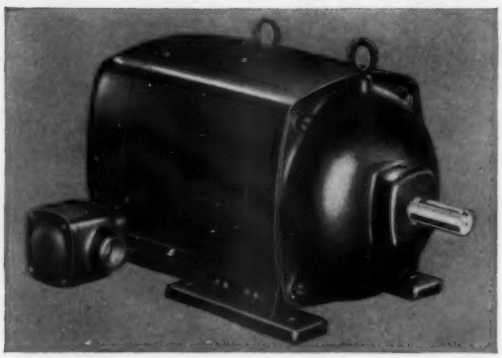
"1. We are continually being tempted to accept slide rules with special scales, and cookbook formulas to give us an easy way out in conducting our work. None of these should be accepted as a substitute for judgement and a thorough knowledge of fundamentals. The semi-authoritative figure evolved from running through such a formula should never be accepted without a lot of questioning.

"Ball-peen"

"2. This system would constitute justification for hiring additional clerical help. We should check to determine whether the cost would really be justified by the results since equivalent answers are produced every day by an informal process of integration within the mind of the alert and well-informed plant engineer. Such a man will be continually weighing the various variables which are mentioned in the article together with other variables which were not mentioned. By this process, answers are evolved which are tempered with judgment.

"3. Before instituting such a system we should ask whether the proposed system will work for us or whether we are going to end up working for the system.

"4. Some of the other variables involved are mentioned below: A. Is the unit in steady use? Is it rarely used or is it kept only for stand-by use? B. Even



Leland Type PA, Polyphase, Explosion-proof (Underwriters' Approved, Class I, Group D), Externally fan cooled, Ball bearing, Integral HP

LELAND never cuts corners

Leland Type KL, Capacitor start. Induction run, Drip-proof, Sleeve bearing, 1/6, 1/4, or 1/3 HP

There are many different ways to build an electric motor — drip-proof, totally enclosed, explosion-proof. . . .

Basically, however, there are only two. To meet necessary specifications. Or to build it as though you yourself were the end user . . . to build it as you know it *ought* to be built.

Leland, since its very beginning, has built motors this second way.

Every Leland is made of the finest materials available consistent with user economy. Every Leland is designed to be better than it *has* to be.

It's no way to get rich quick. But it has proved to be good business. And it's a firm policy the proud engineers and craftsmen of Leland will continue to pursue.

Investigate the value of this policy to *you*. Leland manufactures a complete line of motors from 1/6 to 5 horsepower, in all of the standard types and enclosures.

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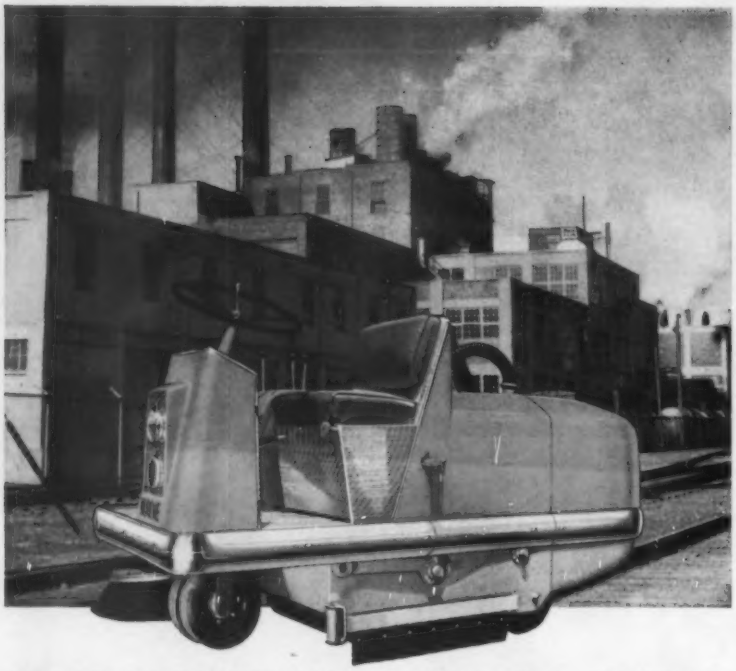

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"Filter-Vac Dust Control"—NO DUST BAG TO EMPTY. High Velocity fan deposits fine dust into main dirt hopper automatically. (Patent Pending)

"Power-Flex" Action enables Wayne to pick up larger objects or to travel without sweeping.

Power Dumping, hydraulically operated while driver is seated. Disposes of refuse in one quick, simple operation.

Sweeps over 100,000 square feet per hour! Rugged, dependable, economical! Years of experience behind famous Wayne Street Sweepers have gone into the design and development of the new Wayne Power Sweepers.

- Vacuum attachment for cleaning shelves and bins (available for all models).
- Larger hopper capacity.
- L.P. Gas models (available).
- Extra power for greater sweeping capacity and ability to climb steep grades.
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if the maintenace cost is low, would the possibility of a shut-down be disastrous in terms of lost production (as in blast furnace and other continuous process work where the cost in lost production could be out of all proportion to the total cost of a replacement component)? C. What is the picture on possible savings in operating cost (fuel, electric power, lubrication, type of operator required, etc.)? D. Is a safety hazard involved? E. Is the maintenance cost attributable to a deficiency of the entire unit or to a defective component within the unit?"

Plant Engineer in Charge
Name Withheld by Request

Will Apply It When Time Permits

"IN ANSWER to your letter of May 10, 1955, the article 'Maintenance Costs—Do You Know They're Excessive?', outlines an excellent point-system governor for a maintenance program.

"However, as is the case with the application of point systems to most problems, there are the unpredictable variables which often completely upset the predictions and accuracy of such systems. In this case I am thinking of the problems of applying reasonably accurate wear factors to equipment involved in constantly fluctuating shift operations, and also to greatly varying impact loads as may be expected in a job shop operation. Into this problem also would enter the over-loading of equipment which not only cannot be controlled by the Plant Engineer, but often does not come to his attention until a serious breakdown has occurred.

"On the whole, this plan appears to be a practical basis for a maintenance and equipment replacement yardstick, assuming intelligent follow-up is incorporated as a segment of its operation.

"When time permits, I'll make some spot applications of it in our shop and let you know the problems I encounter."

B. J. Drummond
Plant Engineer
Detroit Steel Products Co.

Shows Thought and Ingenuity

"IN REPLY to your letter of May 25 concerning the enclosed page proofs of an article on maintenance costs, the following comments are made. The article shows considerable thought and ingenuity and probably serves the purpose for which it was intended. Though considerable work would be entailed in using this method in a large multiple plant operation.

"There are factors not shown as considered in the paper though the author may have had them in the back of his mind. These consist of operating department responsibilities for costs and the production down time cost.

"The first of these, the operating department which is being billed for maintenance costs on equipment, knows what the average costs should be and questions the maintenance department when the average is exceeded, since it affects the price of the product being manufactured. The maintenance department is then required to determine whether the average cost will be higher in the future and if replacement is required. (Same result achieved as application of material contained in the paper.)

"The down time to equipment also produces a red flag caused by production

To meet an estimated heat loss of 7,400,000 Btu per hour in their new plant, Hunter Fan installed five 1,000,000 Btu, four 500,000 Btu and one 400,000 Btu Dravo *Counterflo* Heaters.

The new L-shaped factory building, 350 by 420 feet, supplies 108,000 square feet of manufacturing and storage space. Dravo Heaters meet varying heat requirements easily despite the fact that one-sixth of plant's total wall space is window area.

Southern factory finds economical answer to plant heating problem

Much of the South's rapid industrial expansion can be credited to its year-around sunny, mild climate. But this same climate has presented some unique heating problems to manufacturing firms like Hunter Fan and Ventilating Company of Memphis, Tennessee. Their particular problem was to provide an efficient yet economical heating system for their new factory building.

In addition to the normal heating requirements, experience indicated that "chill" conditions prevailed during many winter and early spring days, particularly in the morning hours. This "part time" heat requirement indicated the need for a conventional system that could not only handle their normal needs but also have sufficient flexibility to meet these varying demands. Specifically what they needed, Hunter plant engineers decided, was a system that instantaneously handled a wide variation of heat requirements and yet was low in initial cost, maintenance, and compact enough to fit limited space in modern, low factory structure.

As cooling and ventilating specialists, they examined and evaluated all types of heaters and heating systems. Ten Dravo *Counterflo* heaters were found to be the ideal answer to their plant heating requirements.

Regardless of your plant location—East, West, North or South—you'll be dollars ahead by carefully investigating Dravo's quality heaters to see how their many features work for over-all heating efficiency and economy every day of operation. The coupon below will bring you all of the details—mail it today!

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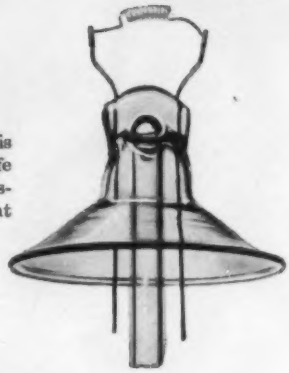

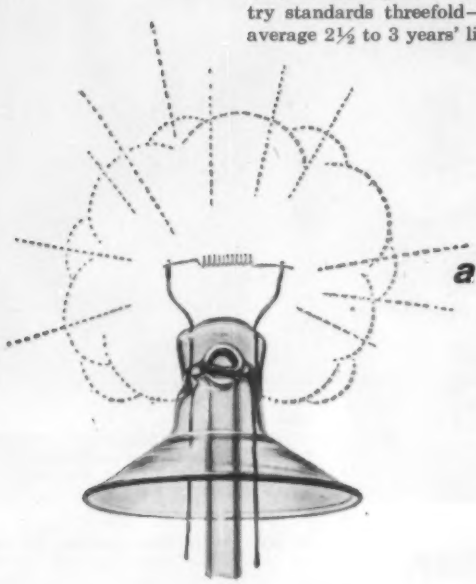

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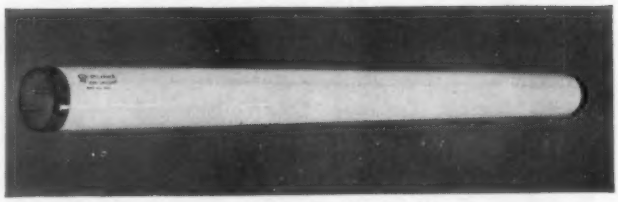
Check the uniformity of performance and appearance, the maintained brightness and life of Sylvania lamps against those you are now using. If, in your opinion, they do not outperform your present lamps, send them back with your certificate, and Sylvania will refund the full purchase price. Order a trial lot from your Sylvania supplier today.



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losses and in many instances is the economic reason for equipment replacement. It may seem that down time and maintenance costs should have direct relationships but this is not always true since I have seen a $15 crane repair job shut down the production of a department for three hours with a labor and material loss amounting to $3,000. This is an extreme case but cited as an example.

"Just to add another complication to the picture, most companies for purposes of insurance maintain their buildings to within 80 per cent of value. If this is done on a yearly basis then replacement can be based on the building being unsuitable for the type of operation performed or replaced for esthetic reasons."

O. W. Graveley
Director of Maintenance
Office of the Asst. Secretary of Defense
Washington, D. C.

Could Use But Not Now

"In the application of this system to Navy use, it would be difficult to establish and maintain the wear points, limits or operating conditions in view of the magnitude and variety of equipment and facilities used in Navy shore establishments. The initial determinations could be made, even though it would take considerable time. Once these factors were established, there would be a need for continuous review and adjustments since the Navy's operating conditions vary at times from maximum usage to a standby status. In view of the foregoing, it appears doubtful whether the benefits gained would offset the expense and effort to maintain the necessary records.

"The proposed system would give you a signal as to when maintenance costs were excessive and when an item of equipment should be replaced.

"The system is really not complicated, but it would require "closer" accounting procedures and certain revisions to the History Facility cards being put into use at the present time.

"I do not believe the system would be too effective until such time as you had four or five years of Maintenance Cost Records from which you could evaluate whether costs were excessive or not.

"To incorporate this into our Maintenance Control Program would require additional personnel.

"In conclusion, I think the system is O.K. and would be of value to the Navy, but I don't believe we are ready for it. Any attempt to adapt or add this to our Maintenance Control Program now or in the near future would only add to the confusion. When our Maintenance Control Program is more mature, then a system similar to this one might be added to advantage."

Lt. C. J. Baker, Director
Maintenance Control Dept.
U. S. Naval Base
Norfolk, Virginia

Food for Thought

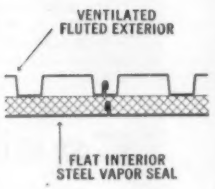
"I have passed this article around among various members of my own Plant Engineering Department and also have submitted it to the Industrial Engineering Department. To answer all three questions in the order in which you have placed them, I would like to make the following comments.

"1. It is the consensus of opinion of

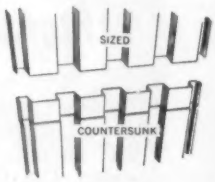
An office building designed by Giffels & Vallet & L. Rossetti, Associated Engineers and Architects, Detroit.

3 Good Technical Reasons For Specifying Robertson Q-Panels

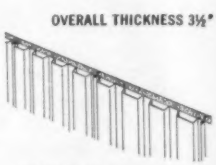
1 **Continuous Sealed Joints** The interlocking side lips on both the inner and outer surfaces of the panels are caulked to provide a continuous sealed joint. Thus, when the panels expand or contract, the joints do not separate but remain in contact with the caulking material. This efficient side joint effectively maintains the insulation qualities of the wall and prevents the infiltration of air, dirt and moisture.



2 **Flush Lap Joint** Special conditions often make end-joints unavoidable. All standard Robertson Q-Panels are die-set and countersunk at the end lap, producing neat, almost invisible joints, with full insulation at that point. This feature eliminates the inefficient butt-joint with its unattractive through-wall flashing and consequent insulation loss.



3 **Efficient Insulation** The U-Value of an M-Type Q-Panel wall is .125 BTU per sq. ft. per hr. per °temp. diff., F. This was established by careful tests made at one of the nation's leading industrial research laboratories. Special attention was given to thermal conductivity at all critical points along the wall and the established U-Value is an average over a stretch of wall involving several side laps. Use the coupon to write for details.



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COCHRANE DEALKALIZER SAVES UP TO $2000 PER YEAR AT READING HOSPITAL. When pipe replacement costs reached $2,000.00 in one year, the Cochrane Dealkalizing equipment shown at right effectively reduced CO_2 to less than 2 ppm—more than 90%!

Cochrane

Salt-splitting Dealkalizer *effectively* reduces alkalinity

Corrosive attack due to the presence of carbonic acid in condensate can be especially harmful in condensate return lines. This carbonic acid forms in the boiler steam, due to high alkalinity in the feed water. The COCHRANE Salt-Splitting Dealkalizer offers a simple, effective, and economical means of reducing alkalinity, thereby solving this problem.

The system is composed of a Cochrane Sodium Zeolite Softener and a Dealkalizer. After passing through the Softener, the effluent is fed directly to the Dealkalizer. Here strongly basic anion resins exchange their chloride ions for alkalinity. Regeneration is accomplished quickly, easily, and at low cost by means of sodium chloride brine.

Direct-acting SOLO valve for small units, or pilot operated HYDROMATIC valve for larger units provides simple, fool-proof control of the regeneration. Automatic control can be provided where required. Write for Publication 4567.

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both of our groups that it would not be readily applicable to a small or average plant. It is apparent to us that the average plant management would frown at the extra overhead expenditure for clerical help required to set up such an elaborate and complicated system.

"It might be possible to place such a system in operation in a large plant or a government facility where the actual overhead costs are not tightly controlled. To give you an example of what I mean, my department is permitted only three clerks to handle all the enormous amount of paper work which is entailed in the operation of a plant with floor space of about one million square feet.

"2. It seems to us that better use could be put to the time required to solve the mathematical formulas needed to compute the age of miscellaneous machinery. We do keep a history of each machine in operation, and the cost of all repairs is maintained on a master card. When, in our opinion, the cost of repairing a machine during the operating year exceeds that of interest on the capital investment of a new machine, then these machines are obsoleted and replaced with new and modern machines.

"Unfortunately our operation involves a tremendous amount of red tape and paper work which is necessitated by our classified set-up, and we could hardly be called a normal judge as we personally are highly prejudiced against any paper work whatsoever. However, we would say there is food for thought in this article and that it undoubtedly could be greatly simplified and as a result it would be of much benefit to many organizations."

E. G. Applegate
Plant Engineer
Bendix Aviation Corp.
Kansas City Div.

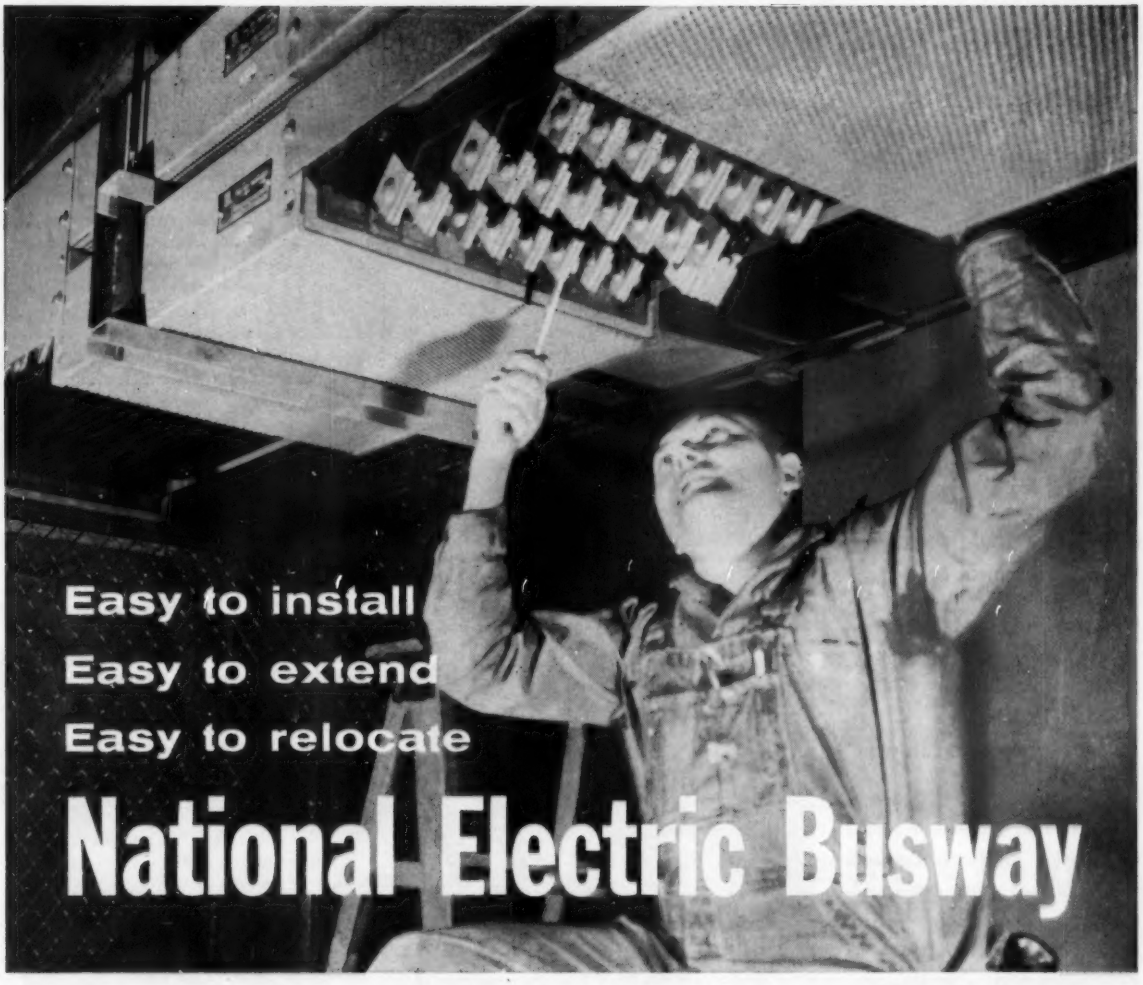
Timing Belt Drives

(Continued from page 107)

main drive to the grinding wheel. This is a short center drive with the driven pulley much smaller than the driving pulley. This type of drive is used because it provides for an improved quality of grinding due to the constant angular velocity of the driven shaft.

Transmission of power from a diesel engine to an air compressor by a timing belt drive is shown in Fig. 3. The diesel operates at 1000 rpm and develops 25 hp. The compressor is three stage, three cylinder, rated at 140 cu ft per minute, at 870 rpm.

Another example of these drives is where a standard 50 hp motor was used to drive a pump to force various viscous fluids through processing equipment in a chemical plant. The normal power consumption is around 35 hp but this naturally increases when a heavy fluid is pumped on a cold day. A drive pulley nearly 6 in. in diameter is used. It operates at 1750 rpm and the driven pulley runs at 60 rpm. A "Timing" belt 5 in. wide of heavy duty construction transmits the power.



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National Electric Busways are designed to meet today's industrial requirements, yet provide capacity for future expansion.

Streamlined, compact, they're designed to permit the most economical, convenient, flexible and salvable layout possible.

NE "Lo-Loss" Feeder Busway

- Designed for current transmission up to 4000 amperes at 600 volts or less.
- Easy to install because single bolt connectors are used to join sections. Joints are silver-plated.
- Compact—Requires only 50% of the area needed for conduit and cable installations.
- On vertical installations, exclusive self-contained insulator support frame carries entire weight of bus bars independent of housing.
- Simple, accessible bolted connections which allow for quick and easy installation.
- Bus bars insulated with Fibron plastic tape. High dielectric strength and heat resistance.

NE "Plug-In" Busway

- Rolled edge copper bus bars.
- All bus bar ends are silver-plated.
- Simplified, sliding type "plug-in" opening doors. No removable parts or springs.
- Natural gray finish baked to a hard surface inside and out.
- Insulators supported in a sturdy 12 gauge steel channel frame withstand rough handling during shipment.

For remodeling or new construction of commercial or industrial buildings, you'll find it will pay you to send for complete information on NE Busways today.

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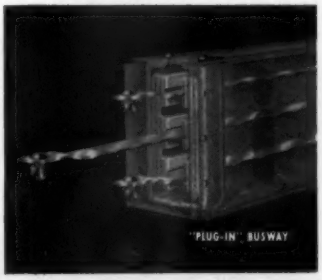

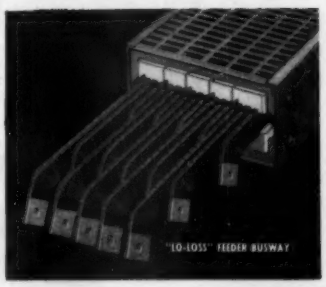

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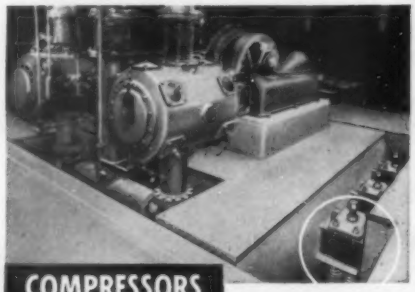
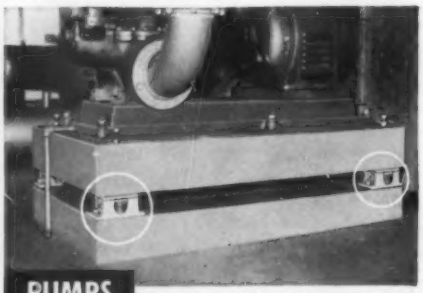
Whether your problem is simple or complex, Korfund engineers will gladly recommend the easiest, most economical, effective solution. A half-century of experience is at your disposal. There are standard stock Korfund isolators for the majority of installations — special designs when necessary.

A selector chart is available, giving recommendations for both normal and critical conditions, for pumps, compressors, centrifuges, machine tools, presses, hammers and most other processing and mechanical equipment. Write us for your copy of Bulletin No. 12, or see our catalog in Sweet's Files.

SHAKER SCREENS Korfund Vibro-Isolators installed under these shaker screens, located on a barge, stop vibration transmission into the deck without reducing the efficiency of the shaking action which removes shale cuttings from off-shore oil drilling mud. Another application—low cost upper floor screen installation without reinforcing.



COMPRESSORS Korfund Isolation permitted installation of five 250 H. P. duplex compressors in limited basement space actually overlapping building column footings—yet completely kept vibration from delicate bacteria cultures on upper floors of this pharmaceutical plant.



PUMPS Korfund Vibro-Isolators installed under this large pump and its driving motor completely stop transmission of vibration and objectionable noise to floors below.

For specific recommendations without obligation, contact us or the Korfund representative you'll find in most principal cities.

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Industrial X-Ray Rooms

(Continued from page 101)

traction of noise or interruptions should be avoided.

Since the disposition of the radiographs depends upon the purpose of the examination, the film may either be thrown in a discard container, be stored for a predetermined period up to ten years, or be held until the disposal of the parts is accomplished. Films may be filed in special filing cabinets or in sectional shelves available from the x-ray companies.

Since x-ray departments are required to keep records of production, techniques employed, personnel, supplies, etc., standard office equipment is necessary. A place for the storage of personnel film badges, ionization chambers and survey instruments should be provided in the office.

Planning of x-ray darkroom is dependent upon the maximum film output of the x-ray equipment to be installed. The darkroom must be capable of functioning easily at peak activity. It must be strategically located with respect to the x-ray equipment, the reading room and film storage facilities. Darkroom designs run the gamut from a small darkroom which may not exceed 5 ft by 5 ft to a darkroom which may be as large as 30 ft by 40 ft. For maximum efficiency, sufficient equipment must be provided to prevent the piling up of films at any point in the processing procedure. In every case, the room should be as small as practical for efficient operation in semi-darkness.

The darkroom may be designed for one of two types; manual or automatic processing. In either case, manual loading or unloading of the film is required. The selection of the type of darkroom processing facilities is dependent upon the number of films to be processed. As a rough rule, if more than sixteen man hours per shift are to be expended or more than 300 films per shift are to be processed, automatic processing should be considered. In some cases, automatic processing units have been used efficiently down to 100 films per shift. It should be kept in mind that a clean, well organized darkroom is a necessity for the production of quality radiographs. Spots, streaks and patterns causing faulty interpretation frequently can be traced to poor darkroom conditions.

In the interest of efficiency, the floor space should be as small as practical, Fig. 4. This layout sketch is typical of the type supplied by the x-ray companies who handle darkroom equipment.

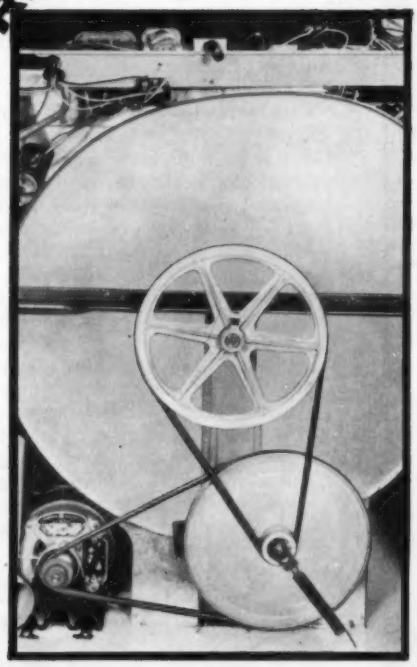
The most satisfactory layout divides equipment into "wet" and "dry" items

Vibration

REDUCED TO THE VANISHING POINT

REDUCED TO THE VANISHING POINT

REDUCED TO THE VANISHING POINT



in the electronically-made

U. S. VIBRA-LESS V-Belt

The new U. S. VIBRA-LESS Belt brings new efficiency to washing machines, driers, belt-driven fans, air conditioners, machine tools, grinders and a host of other applications. *Electronic tension* and a *new molding method* are the reasons why.

Electronic Tension process builds the pulling cords into the belt by error-proof electronics, instead of by mechanical means. All cords are placed and spaced with scientific accuracy—to guarantee that each pulls its full share of the load, thereby prolonging belt life. Each cord is of equal tightness, for exact uniformity and greater reliability.

And along with Electronic Tension, "U. S." has introduced a *new method of molding* which produces a smooth surface with no high spots or imperfections. Consider what this means to high-precision machinery.

The new U. S. VIBRA-LESS Belt is so superbly accurate and uniform in construction that it runs with a smoothness and a silence never before encountered on a V-Belt drive. It reduces wear and tear on pulleys and bearings, prolonging belt life and drive life, and the equipment on which it is used. *Vibration is imperceptible,* thanks to the unfailing accuracy of these new developments.

U. S. VIBRA-LESS Belts are obtainable through any of the 27 "U. S." District Sales Offices or any of the selected "U. S." distributors.

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placed on opposite sides of the darkroom.

On the "wet" side of the room are located the sink for preparing solutions, the solution tanks, the rinsing and washing compartments, the replenishing solution container, a drying rack and a film drying cabinet. The sink should be provided with hot and cold water facilities for mixing and for cleaning. For mixing the solutions, it is handy to have two long enamel mixing pails. A storage space should be provided for the pails and for solutions which are kept in reserve for replenishing current supplies.

Usually radiographs are processed by the tank method. For larger installations and preferably for all processing, the main tanks should be insulated with a separate washing compartment and with separate solution tank inserts. By using this divided master tank, the solutions are insulated from the wash compartment and their temperatures are not affected by that of the wash water.

Because the chemical components of the developing solutions are in balance only within a narrow range of temperatures, control of the temperature is quite important. The temperature of the solutions in the inserts is regulated by controlling the temperature of the water surrounding them. Combination refrigeration-warm water units have been developed with automatic controls and thermostatic blenders to hold the supply water at a uniform temperature throughout the year. An accurate thermometer should be available for checking the temperature.

The "dry" side of the room should contain all the facilities for loading, unloading and storage films. These facilities would include loading benches, hanger-storage racks, film bins, wastepaper containers, film holders, storage compartments and safelights.

Film Processing Units

Where the number of films processsed per day is high, film processing units are frequently used. They offer the following advantages:

1. Reduces personnel and relieves operator of constant attendance.
2. Provides automatic transfer of film.
3. Saves chemicals by reducing contamination.
4. Reduces number of films retaken due to faulty processing.
5. Maintains accurate and consistent film processing.
6. Reduces floor space per film.
7. Allows closer scheduling of radiography.

When these machines are used, the exposed film is received in the darkroom and suspended on specially designed hangers by a manually operated loader. These loaders handle from one to four sizes of film. Usually a minimum of two loaders are required. The loaders will occupy more loading bench area than in the manual processing room. Since more films are generally put through the automatic processing devices per day than manual, the "dry" side of the darkroom will require proportionately larger numbers of facilities for film storage, film holder storage accessories and waste receptacle. Similarly, storage space for processed films will have to be proportionately larger.

In general, darkroom equipment requires two single-phase line supply voltages, 115 and 20 a-c voltage.

The following equipment requires 115-volt supply: safelights, timers, film dryers, ventilator motors and illuminators. Refrigeration units and water heating units may require either a 115 or 230-volts supply. Automatic processing equipment requires 230-volt supply.

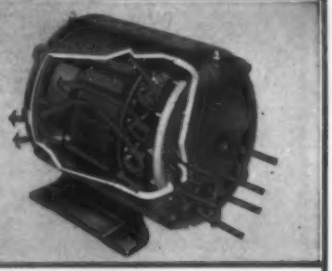
Electric wiring and all electric

To PLANT ENGINEERS, Howell suggests

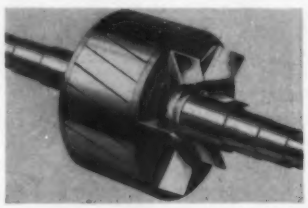
What to look for in Part-Winding Motors

If you've investigated reduced voltage starting of centrifugal pumps, compressors, etc. with part winding (synchronous) motors, you know of the economies and efficiency to be gained.* But, as in other types of motors, manufacturers' constructions differ considerably. Below are some points for comparison . . . and a few of many reasons why Howell motors are so outstanding!

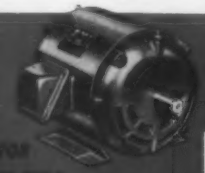
VENTILATION . . . "Cool running" means long life in motors. The steel shell of a Howell motor and a new stator design with the largest air passages yet devised put ample ventilation where it's needed. Compare!



BEARINGS . . . They should be fully protected. Dirt can't enter Howell's double shielded bearings either from inside or outside the motor, because they are sealed in the end plate cavities by dust-tight inner caps. Compare!



COPPER-CLAD ROTORS . . . Howell motors have copper-wound rotors. This means better heat conductivity, stability at high temperatures and, as opposed to die-cast rotors, greater design flexibility to meet your special requirements. Compare!



HOWELL MOTORS

HOWELL ELECTRIC MOTORS COMPANY, HOWELL, MICH.

Precision-Built Motors for Industry Since 1915

HOWELL Part-Wound MOTORS

For more facts circle 640 on Reply Card

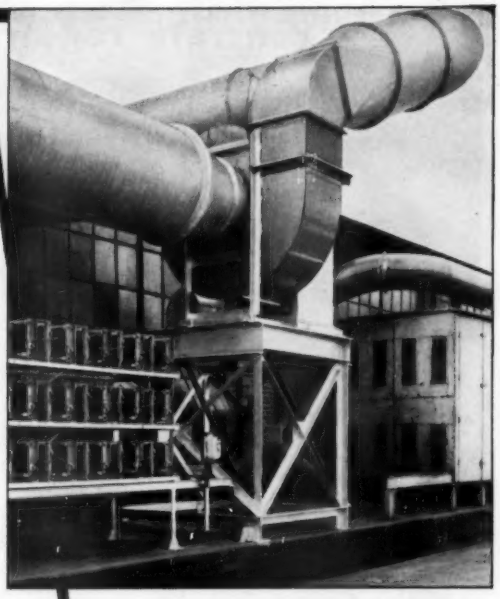
EFFICIENT ENGINE EXHAUST SYSTEM AIDS IN TESTING

Caterpillar®

DIESELS

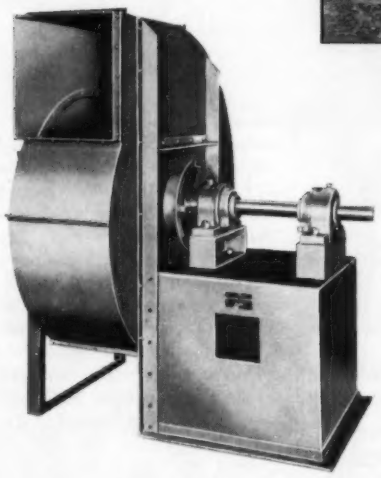
DIESEL ENGINE testing requires safe and effective removal of high-temperature exhaust gases... Caterpillar Tractor Co. gets peak performance with carefully engineered exhaust systems serving batteries of engines under test. BAYLEY stainless steel exhaust fans, expressly designed for applications like this, handle the corrosive gases with minimum power, back-pressure, and maintenance.

Results such as these are typical of Bayley's experience in the design and production of air-handling equipment to meet the most exacting requirements.



Stainless steel fan handles 17,000 cfm of 1000° F. diesel exhaust gases.

CATERPILLAR diesel-powered machinery contributes to America's expanding highway construction program.



Bayley Type EX high-temperature fan similar to that used in Caterpillar exhaust system.

WIDE EXPERIENCE

by BAYLEY in fan application engineering can aid in providing you with the best air-handling system — whether simple or complex. Consult Bayley engineers for recommendations.

Bayley BLOWER COMPANY

1825 South 66th Street • Milwaukee 14, Wisconsin

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for hard—tough—dense concrete repairs..

Non-Shrink

EMBECO PRE-MIXED MORTAR

Outlasts and outwears plain cement-sand patches because...

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- *Does not shrink* upon hardening.
- Bonds tightly to old concrete and mortar.
- Tough iron particles serve as reinforcement.
- Density resists water and oil penetration.
- Higher compressive and impact-resistant strength.
- Hard—contains no asphalt.

EMBECO PRE-MIXED MORTAR IS READY TO USE—you add only water.

Used to patch cracks, disintegrated and worn concrete floors, walks, steps, walls, etc.

Write for 4 page folder illustrating many applications.

Creators and Manufacturers of Products to Improve Concrete and Mortar

THE MASTER BUILDERS CO.

CLEVELAND 3, OHIO — Subsidiary of American-Marietta Company — TORONTO 15, ONTARIO

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NEW

The Viking pump line exceeds all others in the rotary pump field. This one fact alone means you can have a pump to really fit your needs . . . one that is efficient for your job.

Send today for the new 28-page catalog giving complete data on 306 General Purpose Viking pump models. Capacities from ½ to 1050 gallons per minute.

In addition, there are 450 other cataloged Viking pumps, plus thousands of special designed models to fit your needs. Viking is truly the pump designed to do your job better.

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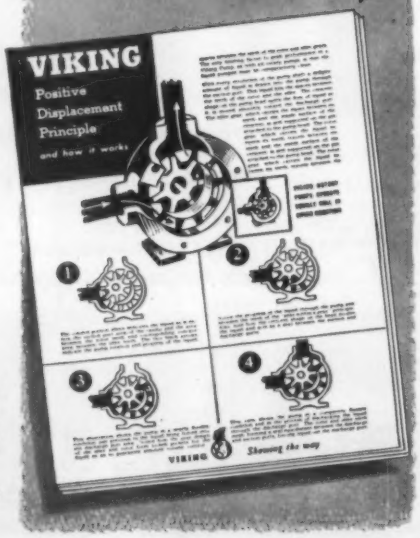
VIKING Pump Company

Cedar Falls, Iowa U.S.A.

In Canada, it's "***ROTO-KING***"

See our catalog in Sweets

28 page Viking General Purpose Pump Catalog



For more facts circle 643 on Reply Card

equipment in the darkroom should conform to local regulations and those set down by the National Board of Fire Underwriters. Water, developing solutions and electrical equipment make a potentially dangerous combination.

All outlets, switches, sockets, etc., should be composed of insulating materials. Pull chains should have an insulating link length. There should be two switches at the entry; one for the safelight circuitry and one at an unusual height for the normal room light circuit so that the darkroom operator will not turn them on accidentally. The room light should be of incandescent type. Outlets for 115 volts should be placed near the processing tank and the loading benches for timers, heaters, dryers, and safelights. It is desirable also for a circuit to be provided to guard against the room light being turned on when the film bin is opened.

Water Supply

The water supply must be pure to prevent solution contamination. Twenty-eight to several hundred gallons per hour may be required, depending upon the size of the processing and washing tanks.

Permanent piping for the water supply should be brass or copper. The x-ray equipment supplier will recommend the required pipe sizes. Drains made of ceramics or molybdenum stabilized stainless steel are probably the most satisfactory since standard drain material will corrode unless care is taken to flush down the discarded processing solutions. As a further precaution, larger than normal diameter pipe as well as a greater than average pitch in excess of ½ in. per foot should be used. In designing the darkroom, removable panels should be provided to make the plumbing accessible.

Since the darkroom generally is a small enclosed structure and since the relative humidity is high, the temperature should be kept at approximately 70 F. Consideration should also be given to venting to eliminate surplus moisture, chemical fumes and used air.

During hot weather it is desirable to air condition the darkroom for operators' comfort. In addition, the film dryers should be vented to the outside. The dryer vent and the room vent should be kept separate so that the dust and water vapor in the room is not pulled through the dryer cabinet. Temperature and humidity not only affect the darkroom operator but also the film handling and storage. Temperatures should be maintained between 68 and 70 F with a relative humidity between 50 and 60 per cent. The air should be completely changed

G-E LAMPS GIVE YOU MORE FOR ALL YOUR LIGHTING DOLLARS

How General Electric built a $3 saving for you into a $1.15 lamp

THE amount of light you get from a General Electric 40-watt fluorescent lamp today would have cost you about $3 more only five years ago, counting lamps, maintenance labor and electricity. Here's what made the difference:

29% MORE LIGHT. Today's G-E fluorescent lamp starts off 19% brighter than the 1950 lamp. And it depreciates slower. Over the life of the lamp you get a total of 29% more light.

25% FEWER EARLY BURNOUTS. In rigid laboratory tests, today's G-E lamps show only 15% failures at 80% of life, compared to 20% failure of 1950 lamps. (Actually, it would take the average plant from two to four years to burn out their G-E fluorescent lamps today!)

COST LESS. Since 1950, the net cost of the G-E 40-watt fluorescent lamp has gone down 4¢, for case-quantity buyers.

The photo above shows where two improvements were made. The light-giving phosphor coating inside the glass is much brighter. The cathode, the chemical-coated spiral of wire that carries the electricity, lasts longer and has more uniform life.

For more facts on how General Electric gives you more for *all* your lighting dollars, write for a free 16-page Progress Report to Lamp Users: Large Lamp Department, General Electric, Dept. 482-PE-9, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 644 on Reply Card

about six to ten times an hour with an air velocity of less than 50 ft per minute. The darkroom should be maintained at a positive pressure and the air pumped in preferably through a filter.

The film holders may be brought in the darkroom or be placed in a light-tight, through-the-wall darkroom cabinet. The cabinet doors are interlocked so that only one door can be open at a time.

Occasionally, the film loading and unloading bench will become badly jammed with the operator attempting to keep up with the influx and outgo of film holders. Sometimes adding another operator merely confuses the issue. It then is more practical to have individual loading rooms, i. e., rooms not exceeding 4 ft by 5 ft by 7 ft high with some ventilation where the radiographer can load his own film holders. After a sufficient number of exposed films are accumulated, they can be passed in a light-tight box to the darkroom operator for processing.

Personnel entrance may consist of a lightproof maze or a two-door light lock to eliminate the possibility of accidental exposure of film to outside light. If the x-ray department has only one operator, it is possible to have a single light-tight door which can be locked from the interior during processing. As a general rule, it is best to provide a maze structure to preclude any possibility of film exposure to light.

Floor covering must be durable, waterproof, resistant to the chemical action of processing solutions, not slippery, and of a suitable color. The best floor material is ceramic tile, which is available in several colors and is easily cleaned by flushing. Light colors are preferable.

The most satisfactory finish for the lower part of the walls is washable dark paint which is resistant to chemical action. For the upper part of the wall and ceiling, light colored paint should be used so that the safelight illumination will be reflected.

Since many darkrooms are adjacent to the radiographic rooms, the darkroom design should include additional protection above personnel requirement on the intervening wall. The film subjected to minute quantities of radiation for a period of many weeks before use may be fogged as a result.

Inventory Control at Pioneer

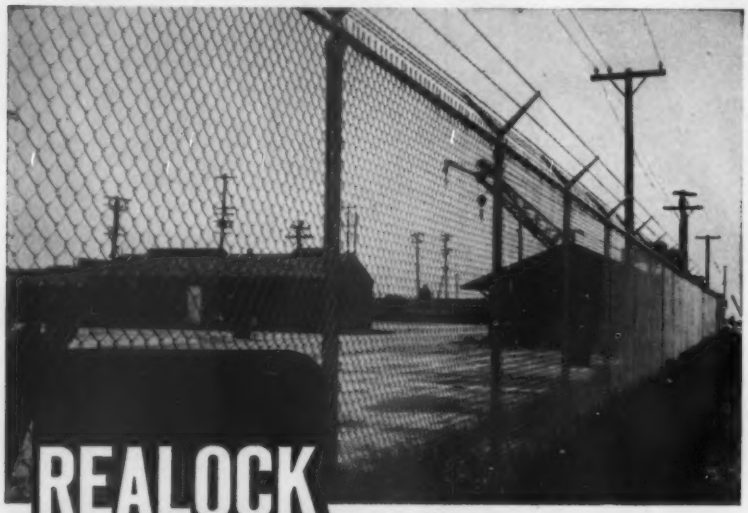
(Continued from page 116)

The in-out and balance record is kept on an override form in the bottom pocket. A special sheet is used in the steel category. In the case of castings which require a finishing operation, we rubber-stamp the two portions of the card "rough" and "finished," so that the information may be detailed even further.

The visible margin at the bottom of each pocket speeds the location of individual records during the posting process, or at any time reference must be made to them. It contains the name and number of the item, specification numbers, and the numbers of any engineering drawings involved.

Also built into this record keeping system is a highly effective control and follow-up method for use at times when materials are on priority. This plan uses a card which fits into the bottom half of the pocket together with a visible signalling system in the pocket margins.

Since this system has been in operation there have been no material shortages of consequence due to a breakdown in inventory control. Moreover, the nature of the equipment makes possible specialized reports which would have been very difficult to prepare before its installation.



REALOCK FENCE

helps you

- reduce number of guards
- prevent burglary, arson and vandalism
- stop pilferage

You get all of these advantages and more when you install a sturdy Realock Fence. The tough, heavy fence fabric will give years of service . . . terminal posts are made of full-weight tubular, I- or H-structural steel sections . . . and, for maximum security, Realock Fence is topped with three, five or six strands of tough barbed wire.

What's more, Realock is long-range protection. It's made of full-weight steel that's heavily galvanized after weaving so that it can give years of trouble-free life under all weather conditions.

THE COLORADO FUEL AND IRON CORPORATION, Denver and Oakland
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REALOCK FENCE
THE COLORADO FUEL AND IRON CORPORATION

CF&I

BRANCHES IN ALL KEY CITIES

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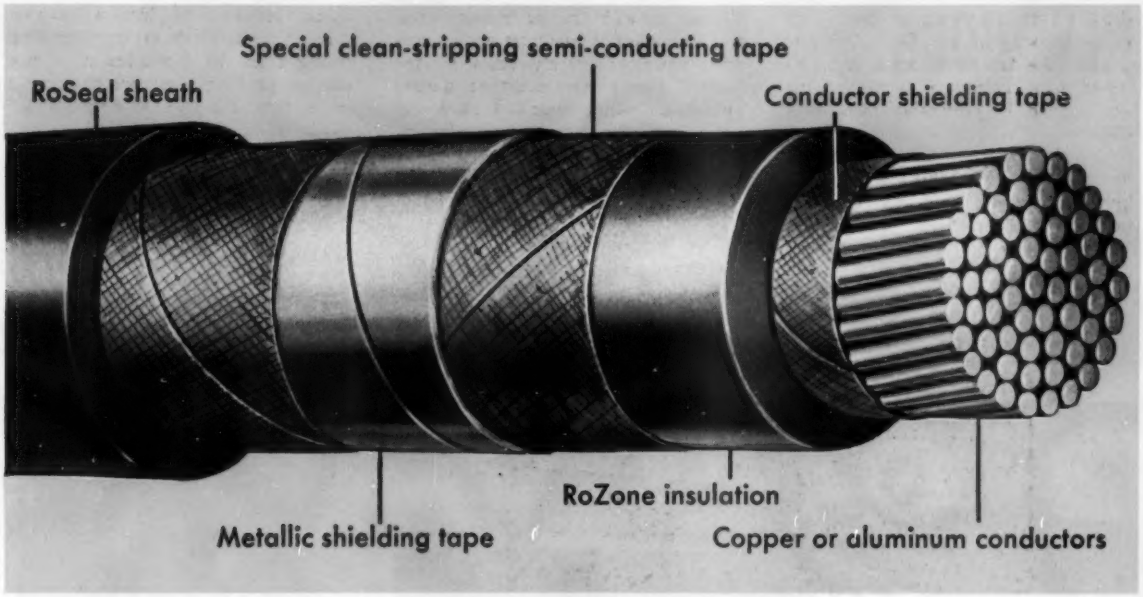

RoZone-RoSeal shielded power cable for high-voltage applications through 15 kv

What this new high-voltage construction gives you

Informative answers to operating questions about Rome's new non-metallic sheath, RoSeal, as applied over oil-base RoZone® insulation.

Q. What is RoSeal?

A. It's Rome Cable's trade name for a special flame-resistant polyethylene compound, presently recommended as a nonmetallic sheath for rubber-insulated, shielded power cables rated up to 15 kv.

Q. What are some of the important operating advantages of RoSeal?

A. 1. Exceptional moisture resistance.
2. Resistance to weathering and soil conditions.
3. Easy pulling (RoSeal's coefficient of friction is much lower than that of any other sheathing material because of its waxy structure).
4. Good abrasion resistance.
5. Durability and long life.
6. Easy bending and installation at sub-zero temperatures.
7. Good resistance to crushing and impact (mechanically equivalent to Neoprene).
8. High resistance to chemicals and oils.
9. Inherently high corona levels on finished cable.
10. Low cost as a sheath for shielded rubber-insulated power cable.

Q. What experience is there on RoSeal?

A. Rome Cable initiated development in 1949 and began commercial usage over 2 years ago. There are now satisfactory installations in utilities, chemical plants, oil refineries and industry. The performance of a well-known similar sheath used on millions of feet of paper telephone cable for the last 7 years—in the air and underground—has been outstanding. RoSeal is similar to this sheath *except* that flame resistance has been incorporated.

Q. Where can you use RoSeal sheathed cable?

A. Use it in virtually *any* location—in the air, conduit, ducts, direct in earth, or even in water.

Q. How do you splice RoZone-RoSeal power cable?

A. Installation procedure is the same as with Neoprene sheathed cable except that you use a thermoplastic tape in place of Neoprene tape, since RoSeal is a thermoplastic.

For detailed specifications on RoZone-RoSeal write today for Bulletin ROT-1.

It Costs Less to Buy the Best

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ROME · NEW YORK
and
TORRANCE · CALIFORNIA

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NEW BOOKS

for the plant engineer

Statistical Report on Metals

METAL STATISTICS-1955. Size 6 7/16 in. by 4 1/4 in.; 864 pp; cloth bound. Published by American Metal Market, 18 Cliff St. New York 38, N. Y. Price $3.50.

THERE ARE a number of changes in the 48th annual edition of this book on ferrous and non-ferrous metal statistics. Included in the new material are the following items: primary aluminum producing capacities of the United States and Canada; annual production, shipments and stocks of brass and bronze ingot in the United States; official specifications for zinc die castings and zinc-base alloy ingot.

Among the extensive tabulated material in this book one can find data on the electrolytic copper refinery capacities of the United States and Canada, including the plant locations; scrap tin prices; U. S. lead production; aluminum prices; cast scrap prices, delivered Pittsburgh points; U. S. automobile production and registration; shipments of stainless steel products in the United States, and tubular goods production.

Vapor-Deposited Coatings

VAPOR PLATING by C. F. Powell, I. E. Campbell, B. W. Gonser. Size 9 1/4 by 6 1/8 in.; 158 pp including index; illustrated. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $5.50.

THREE MEN associated with Battelle Institute of Columbus, Ohio, have put together a great deal of information on the proccesses of vapor-plating. In the early pages of the book, material is found relating to the basic mechanics of vapor-deposition.

Attention has also been given to brief coverage telling how coating processes can be duplicated in a laboratory set-up using Pyrex glass. Illustrations of the apparatus help clarify the text information.

A number of metals are given consideration in the book as to the ways that they render themselves to vapor-deposition. Some of these are copper, berylium, aluminum, titanium and tin. Accounts on the properties of various deposits are also included.

There are separate sections devoted to metal carbides, boron and borides, silicons and silicides, and oxides covering their implication in coating deposition. In addition to this, the book contains extensive lists of references for further information.

Building Systems

MECHANICAL AND ELECTRICAL Equipment for Buildings. Size 8 5/8 by 5 5/8 in.; 564 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Ins., 440 Fourth Ave., New York 16, N. Y. Price $8.50.

REVISIONS AND CONTENT expansion, make the third edition a more useful adjunct to a technical library. It is a comprehensive publication touching on various aspects of design relative to building systems and equipment. The book is presented in a relatively simple manner and contains a liberal number of helpful illustrations in addition to practice problems.

There are six main sections in the book, namely water supply, sanitation, heating, air conditioning, electrical equipment and acoustics.

Some of the specific subjects considered in the book are as follows: water pumping, hot water equipment and design, sewage disposal, steam heating, radiant panel heating, air conditioning design computations, wiring system design, electrical materials and installation methods, lighting systems, elevators and escalators.

With an increase in business, the Interior Steel Equipment Co. has augmented their paint baking facilities. In doing this they have achieved economies in handling of work while maintaining and even enhancing the quality of their products.

They installed a Sly Convectioneered Oven, 45' long, 9' 6" wide, 6' 9" high with semi "A" type sheet metal hoods at the exit and entrance ends to form an efficient heat seal. Beneath the oven is a self-contained 2,500,000 BTU per hour direct gas-fired heating unit.

As aids in achieving excellent finishes on the products are: (1) efficient air distribution over the work (2) temperature uniformity in the baking zone (3) correct exhaust conditions to maintain proper oven atmosphere, and (4) a low overall temperature gradient between supply and recirculation temperatures.

This installation is typical of the careful engineering that goes with all Sly Industrial Ovens. *May we discuss your requirements with you?*

THE W. W. SLY MANUFACTURING CO. (SINCE 1874)

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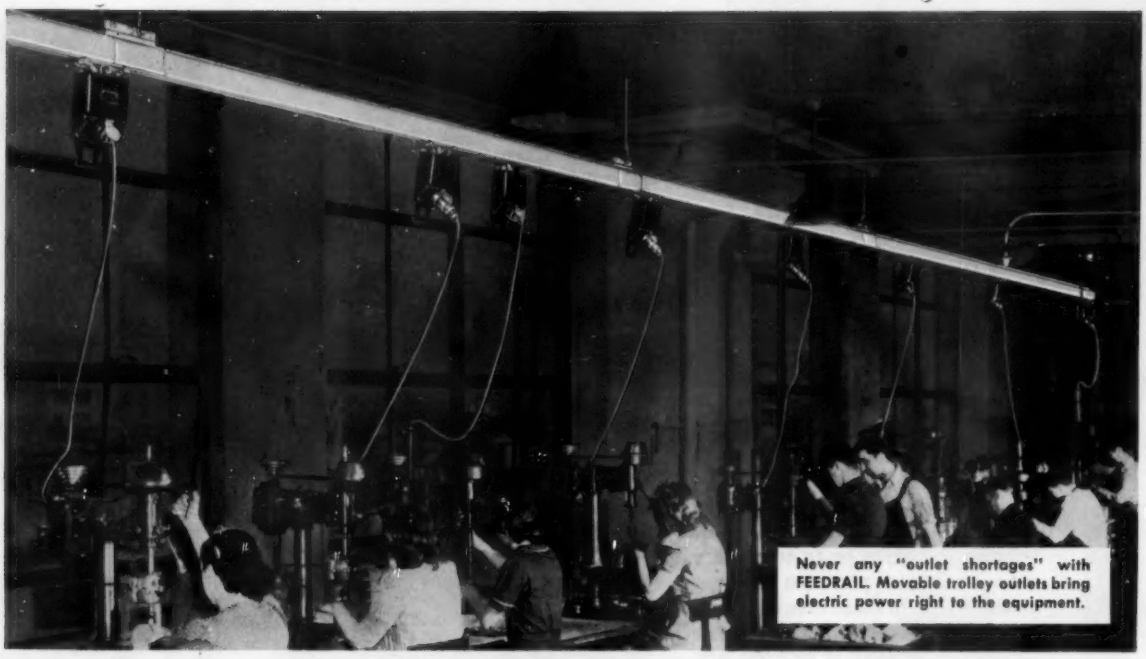


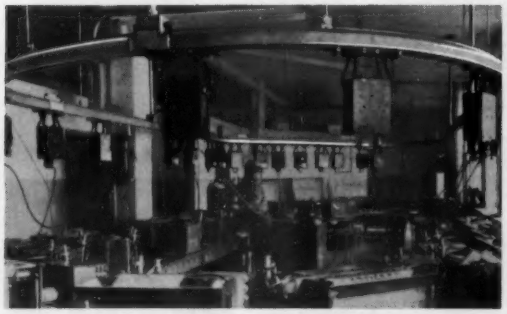
Never any "outlet shortages" with FEEDRAIL. Movable trolley outlets bring electric power right to the equipment.

Efficiency... safety... availability make a

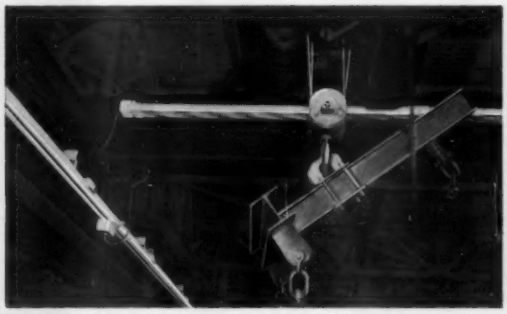
FEEDRAIL Electrification System a "must"

When powering production lines, cranes and hoists, moving test lines — or as power and control circuits on mobile equipment — FEEDRAIL Trolley Busway Systems quickly pay for themselves by increasing equipment availability, providing greater operating flexibility and reducing electrical hazards and maintenance.

FEEDRAIL's free-moving trolley outlets take off power from enclosed and protected buses . . . assure a continuous, dependable current supply anywhere and everywhere the system is installed. Even when equipment is relocated or production lines changed, there will be no major shutdowns for rewiring. The entire system can be easily relocated or extended.



FEEDRAIL brings automation to test lines, making possible continuous electrical tests on equipment as it moves along the line.



No danger of accidental contact with "hot wires" on FEEDRAIL-powered cranes and hoists. Conductors are safely enclosed in sturdy steel housings.

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TRAMBEAM

speeds production at

WESTINGHOUSE

jet engine plant

Here's why jet engine production moves fast at the Westinghouse plant in Kansas City, Missouri! Used in *seven* departments, Trambeam Overhead Handling Systems simplify tool movement to and from machines and speed handling of parts-in-process between machines or to temporary storage. Output per man and per machine is high. Plant areas are *fully* utilized. The need for floor-borne handling equipment is reduced, and traffic bottlenecks are prevented. At Westinghouse, flexible Trambeam is always available when needed, where needed . . . easily push-button operated by one man. Look to Trambeam for your own handling needs!

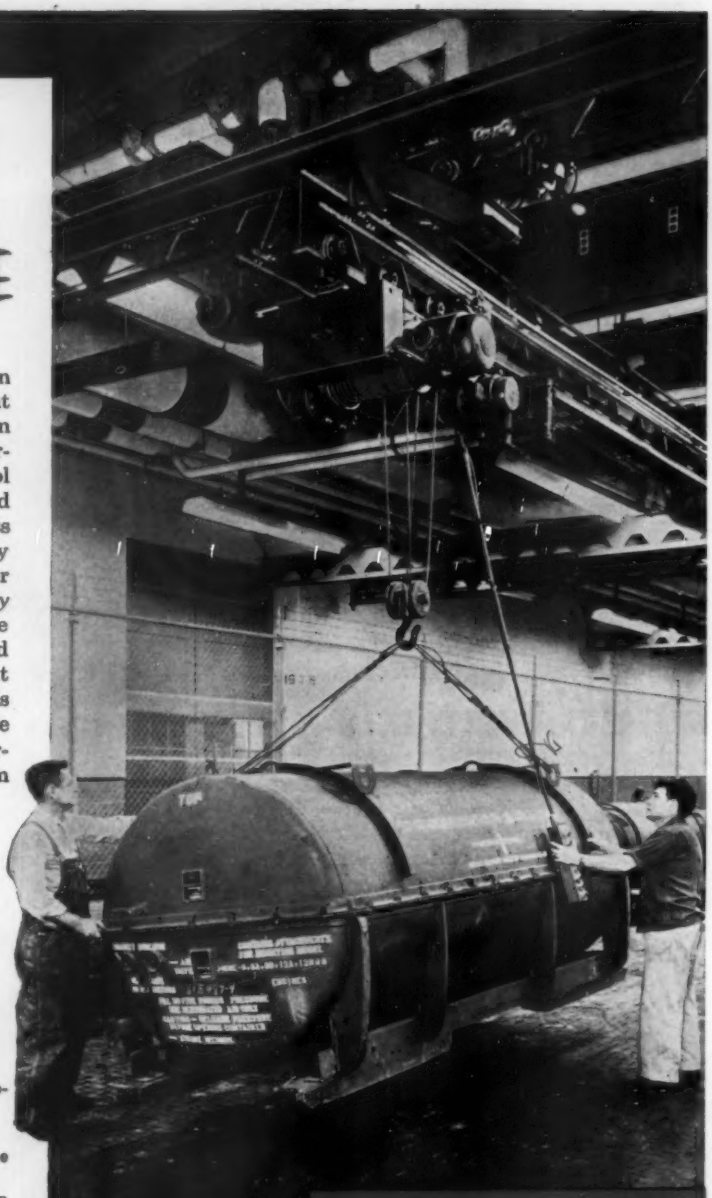
An interesting and informative case study has been prepared on the Trambeam installation at Westinghouse. Send for your free copy today, and the name of your Trambeam distributor.

TRAMBEAM
Dollar-wise Features

- Cranes for complete area coverage . . . monorail for point-to-point transport.
- High carbon rails assure long life operation.
- Flexible suspension minimizes bending fatigue and keeps load stress vertical.
- Friction-reducing carrier design has Timken double row, tapered roller bearings.
- Underhung carriers provide maximum headroom, greater speed and improved control.
- Capacities up to 15 tons with full motorization.

WHITING CORPORATION
15675 Lathrop Avenue, Harvey, Illinois

Other Whiting Products:
Trackmobile • Overhead Engineered Cranes • Electric Furnaces and other types of Foundry Equipment • Chemical Processing Equipment, such as Evaporators and Spray Dryers • Railroad Equipment and Metal-cutting Machinery



WHITING
TRAMBEAM

Here Trambeam is used to quickly move a packed jet engine to the shipping department . . . one of the seven Trambeam equipped departments at Westinghouse.

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CHICAGO, ILL.

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SEPTEMBER, 1955
(This card void after March 31, 1956)

PLANT ENGINEERING

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Company Address..... City..... State.....
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22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49
50	51	52	53	54	55	56
57	58	59	60	61	62	63
64	65	66	67	68	69	70
71	72	73	74	75	76	77
78	79	80	81	82	83	84
85	86	87	88	89	90	91

BULLETINS

101	102	103	104	105	106	107	108	109	
110	111	112	113	114	115	116	117	118	
119	120	121	122	123	124	125	126	127	
128	129	130	131	132	133	134	135	136	
137	138	139	140	141	142	143	144	145	
146	147	148	149	150	151	152	153	154	
155	156	157	158	159	160	161	162	163	
164	165	166	167	168	169	170	171	172	
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DATA FILE

301	302	303	304	305	306	307	308	309	310	311	312	313	314	315
316	317	318	319	320	321	322	323	324	325	326	327	328	329	330
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ADVERTISED PRODUCTS, SERVICES

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64	65	66	67	68	69	70
71	72	73	74	75	76	77
78	79	80	81	82	83	84
85	86	87	88	89	90	91

BULLETINS

101	102	103	104	105	106	107	108	109
110	111	112	113	114	115	116	117	118
119	120	121	122	123	124	125	126	127
128	129	130	131	132	133	134	135	136
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146	147	148	149	150	151	152	153	154
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DATA FILE

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BULLETINS

(Begins on page 21)

157 Trolley Conveyors—Form R-K shows features and uses of overhead trolley conveyors, stressing efficiency of such systems in processing, storage, assembly. Gives details on how low-cost systems are assembled from standard components. Rapistan-Keystone, Inc.

158 Materials Handling Data — This file package contains 25 folders describing interesting applications of company's materials handling equipment. Among industries covered are chemical warehousing, food processing, paper, bottling, furniture, paint, rubber. The case studies folder contains solutions to all kinds of materials handling problems, suggests ways to cut handling costs, gain additional storage space. Lewis-Shepard Products, Inc.

159 Truck Selection Guide—Form 1411, "How to Select a Lift Truck," is based on user evaluation of job requirements and truck features by points with a chart and analysis guide. Some 36 truck features are listed for comparison under such headings as performance, ease of operation, durability. As many as four trucks can be analyzed and compared on the chart. Hyster Co.

160 Tilting Fork Truck—Bulletin 551-2 presents a walking type telescopic tilting fork truck designed for economical moving and storing of pallet loads. Advanced features of this high-lift unit are illustrated and specifications included. Barrett-Cravens Co.

161 On Crawler Tractors—The technical and operating story of company's new HD tractor is told in 8-pp Form NS-662. Provides a pictorial review of the design, engineering, and operating advancements. Includes specifications and information on operator comforts, and lists matched attachments. Construction Machinery Div., Allis-Chalmers Mfg. Co.

162 Oil-Hydraulic Lifts—Catalog RE-203, 20-pp, covers the field of heavy-duty oil-hydraulic lifting devices for industrial applications. Featured in catalog are company's standard Levelator lifts, a 6000 lb single-jack model and a 12,000 lb dual-jack lift. Also featured is an electric pump mounted on an oil tank for powering oil-hydraulic devices. Illustrates lift platforms, platform accessories and safety devices, jacks, power units and control systems. Engineering data and installation recommendations included. Rotary Lift Co.

163 Sling Chains—Catalog S-555, 16-pp, incorporates information for ordering each type of sling—single, double, triple and quadruple—and gives complete data on specifications, illustrations and working load limits for all three grades—Cam-Alloy, high test steel and wrought iron. Data on miscellaneous types, attachments included. Campbell Chain Co.

SAFETY, FIRE PROTECTION

166 Boiler Safety Controls—Bulletin P-30, 8-pp, discusses basic safety controls for hot water space heating boilers. The need for pressure relief valves is shown, along with an explanation of why and how such valves operate. Shows why such boilers must be protected against low water condition, and how feeders and cut-offs can accomplish this. McDonnell & Miller, Inc.

167 Fire Extinguishing Systems — Information on Foamite Airfoam fire extinguishing equipment for combatting flammable liquid fires is offered in this 36-pp engineering data book. Attractively illustrated, this booklet contains useful facts on Foamite Airfoam fixed fire protection systems, portable equipment, and semi-portable equipment. American LaFrance Corp.

METALS

168 Guide to Steels—Identified as a buyers' guide to bars, structurals, plates, sheets and strip, Bulletin 11-2 gives quick information on standard specifications to which these steels are made; type, range, and accuracy of cutting to users' needs, and opportunities to save money by combining orders for these products. Joseph T. Ryerson & Son, Inc.

169 Corrosion Resistant Alloys—Super-corrosion resistant tubing and pipe in alloys known as "B" and "C" are described in Bulletin TD-117. Resistance of both grades to common strong corrodents is described, as well as properties, workability, application data and range of sizes in tubing and pipe form. Alloy Tube Div., The Carpenter Steel Co.

170 Stainless Steel Products—A 16-pp engineering data book, Catalog 55 includes design and dimensional information on flange drilling templates, flange and ring-joint facings, stainless steel pipe, pipe threads, thread engagement; pressure-temperature ratings and conversion factors, resistance of fluid flow; hardness conversion tables, metal casting factors, physical and mechanical properties of stainless steel; and a detailed materials selection chart covering 300 corrosive solutions. Cooper Alloy Corp.

171 Aluminum, Magnesium Casting—Wire-bound between stiff covers, this 58-pp pocket-size handbook presents important factors in successful sand, permanent mold or die casting of a light-metal part. Various sections cover advantages and disadvantages of common casting methods, suggestions for design of parts to be cast, the Al-fin bimetallic bonding process, and a survey of recent light metals research. A section is devoted to characteristics of conventional aluminum and magnesium casting alloys and Elektron premium magnesium alloys. Tables and charts give characteristics and uses, specification comparisons, mechanical and physical properties, recommended heat treatment procedures, chemical composition, high temperature tenside properties. Available to qualified plant engineers, please state your job titlte. Rolle Mfg. Co.

To order these bulletins circle item numbers on the handy Reader Service Cards provided on the facing page.

MACHINE SHOP AND METAL WORKING

176 Welding Equipment—Sixteen-pp Catalog 2350 features company's Aircomatic (inert-gas-shielder metal arc welding process) welding equipment. Manual and automatic units along with accessory apparatus and welding wire are included. Catalog is illustrated with photos and diagrams, and includes full specifications. Air Reduction Sales Co.

177 Rotary Files—Technical data on rotary files for hard and soft metals, plastics, wood and other materials are presented in this 16-pp catalog. Fully illustrated with all files shown actual size, catalog includes chisel cut, ground-from-the-solid and tungsten carbide rotary files as well as countersinks and rasps in a wide range of sizes, shapes and cuts. A series of plastic boxed sets is also illustrated and described. Grobet File Co. of America, Inc.

178 Masonry Blades — Bulletin A-1308-6-55 describes company's Niagara line of masonry blades. Information included covers, blade types and sizes, applications, a comparative grade chart, a description of blade identification systems. The Carborundum Co.

179 Diamond Tools—Colmonoy set diamond tools for specialized grinding wheel dressing operations are described in illustrated Catalog DT-55. Provides a selected cross-section of company's line of dressing tools. Each illustration is accompanied by a description of the tool, its characteristics and fields of applicatioin. Also discussed are Colmonoy castings for use as special machine components. Included is a diamond tool selection table listing recommended diamond size to use with 10 standard grinder wheel sizes. Diamonds & Tools, Inc.

180 On Bit Reconditioning—The "when and how" of reconditioning Kennametal bits is explained in 20-pp Form M-172. Details reconditioning practices and procedures, grinder and wheel care, and maintenace of various types of bits. Booklet is fully illustrated with photos. Kennametal Inc.

181 Carbide Blanks—Eight-pp Bulletin GT-292 includes information concerning standard carbide blanks for mechanically-held tools. Covers carbide blanks for clamp-on style tools, solid carbide on-end inserts, round and square inserts, and triangular and square throw-away insert blanks. It also shows company's new method of grouping carbides into three classifications. Carboloy Dept. of General Electric Co.

182 Reamer Selector—This 20-pp comparative reamer Selector combines style and net price information of company's previous selector with complete dimensional data on all standard reamers, blanks and cutters. It is arranged by decimal equivalents; to use it, look up the size desired to find net price of a particular reamer, then flip an inserted half page and in the same graphic position at intersection of diameter and style columns are remaining pertinent dimensions. Also includes data on reamer sets. Lavalee & Ide, Inc.

183 Optical Tooling—Bulletin 808, 24-pp, is a comprehensive catalog describing optical tooling instruments and accessories for checking and alignment of machines. It includes many items not heretofore available for checking straightness of ways, parallel bars, angle blocks, angular relationship between bed and spindle axis, and for alignment of machinery such as lathes, millers, jig borers, drill presses, spar mills, skin mills, and transformatic and automatic machines. The Farrand Optical Co., Inc.

184 Indexing Devices—Twenty-pp Bulletin S-104 covers company's 8- and 12-in. special super-spacers and their accessories, giving operating instructions, specifications and picturing units in numerous machining operations. Provides details and production data that is needed to put super-spacers to work on a precision production or individual job basis. The Hartford Special Machinery Co.

AMONG THIS MONTH'S NEW LITERATURE OF MERIT . . .

164 Advantages of Infrared—"Applications Unlimited" is a 20-pp reference book on the infrared process. Covers not only the uses of radiation heating, but also its economy and other advantages. Specific examples of its use in a wide range of manufacturing processes are pictured and described briefly. Also included are general specifications, types of ovens available. The Fostoria Pressed Steel Corp.

165 On Distribution Equipment — Two new catalogs on distribution equipment and components are available to qualified plant engineers. The 1955 Quick Guide (Publication GEC-1031), 98 pp, contains list prices and brief descriptive information on products used in light commercial and industrial and other applications. These include load centers, fuse pullers, molded case circuit breakers, safety switches, lighting panelboards, plug-in trolley busway and wireways. Publication GEC-1032, company's 1955-56 general catalog, includes complete pricing and descriptive data covering products shown in the Quick Guide, as well as a complete busway line, panelboards, etc. Distribution Assemblies Dept., General Electric Co.

173 Controlled Humidification—Sixteen-pp Bulletin 500 discusses humidification control, revealing facts on losses caused by dry air during heating season. A detailed explanation of effects of relative humidity on profits, hygroscopic materials, health, dust and static electricity is given. Tables show relative humidities to be maintained for processing and storage of various hygroscopic materials, regain of hygroscopic materials, effect of indoor heating on per cent RH. Lists advantages of steam for humidification, physical data, prices, selection and installation information are given. Armstrong Machine Works.

174 Treatment Units—Technical Reprint T-134, 10-pp, presents a study of factors influencing chemical reactions in hot and cold process treatment units, including effects of type of anion and preformed precipitates, chemical excesses, temperature, varying concentration of preformed precipitates, and contact with magnesium oxide. Test result curves on factors studied indicating what to expect under various conditions are included, as well as a graphic presentation of hot process and cold process units. Graver Water Conditioning Co.

NEW! 'Sexauer' Monel Self-Locking bibb screw – 10 sizes do the work of 37!

NEW! 'Sexauer' Easy-Tite faucet washer with Fiberglas reinforcing

This nylon plug locks the screw *automatically!*

NEW! Amazing, patented screw and washer combination cuts faucet washer replacements 75%

—with each leak eliminated, you reduce water and fuel bills up to $28.80 quarterly

Most faucet washer failures are caused by wrong length screws. 'Sexauer' Self-Locking screws* and Easy-Tite washers* – used together – cut costly washer replacements 75%! You save up to $28.80 quarterly in water and fuel alone with each leak stopped. Here's how . . .

A screw *too short* for the tapping distorts and splits the washer when tightened; the washer works loose, is torn to shreds. If *too long*, it can't grip the washer; this ruins the washer and causes hammering in the water line.

Simplifies fitting problem—cuts installation costs

'Sexauer' Self-Locking screws eliminate the problem of misfit screws. They lock *automatically* at the required depth as the nylon plug is compressed in the faucet thread. The washer is not distorted, is held firmly.

You can re-use Self-Locking bibb screws repeatedly. Made of Monel, they resist corrosion, never rust; heads won't twist off, screw driver will not distort the slot.

Self-Locking screws save time spent in fitting the proper length—10 sizes do the work of 37! Used with new, Fiberglas-reinforced 'Sexauer' Easy-Tites, they cut washer replacements 75%, fixtures last longer. Easy-Tites resist closing squeeze and excessively hot water, outlast ordinary washers 6 to 1!

Water and fuel savings

One dripping faucet wastes 8,000 gals. of water yearly. A pinhole size stream increases waste to 8,000 gals. in a *single month!* Here is what you save *quarterly* in stopping just *one* pinhole leak on a hot water faucet:

Fuel Saving		Water Saving	Total Saving
Oil (198 gals.)	$22.77	$6.03	$28.80
Coal (2,469 lbs.)	22.22	6.03	28.25
Gas (21,103 cu. ft.)	21.20	6.03	27.23

Save water, fuel and labor costs; conserve costly fixtures by cutting washer replacements 75%! Use *new* 'Sexauer' Self-Locking screws and Easy-Tite faucet washers. *You save every time you do!*

WRITE FOR CATALOG. New 'Sexauer' Self-Locking screws and Easy-Tite washers are just part of the line of over 3,000 'Sexauer' Triple-Wear plumbing repair parts and patented precision tools. Send for our new, 126-page Catalog H. *Write today!*

*Reg. U. S. Pat. Off.

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BULLETINS

(Begins on page 21)

186 **Vibro-Isolators** — Bulletin K3A gives latest data on stopping vibration, shock and noise transmission by using company's steel spring machinery mountings. Typical case-histories, complete with installation photos, tell how vibro-isolators solved a variety of vibration problems. Tables giving capacities and characteristics are furnished, including isolator sizes, load capacities, dimensions, and shipping weights. Drawings illustrate typical installation arrangements. The Korfund Co., Inc.

WATER, WASTE TREATMENT

187 **Mixed Bed Demineralizers** — Technical Reprint T-137, 8-pp, discusses treatment of makeup water with automatic mixed-bed demineralizers. An installation at which this type of treatment is used is described, giving factors which led to choice of this equipment. A section is devoted to operation of the system and results obtained. Illustrations include photos of units and panel, detailed flow sheets and results charts. Graver Water Conditioning Co.

188 **Improved Precipitator**—Twenty-pp Bulletin 2204C describes applications, principles of operation, design features, advantages, recommendations, flow diagrams, and specifications of company's precipitator, which offers an efficient means of removing impurities from a liquid by precipitation, absorption, settling, and filtration. Diagrams and photos showing three basic designs are included, as well as dimensions and specifications. The Permutit Co.

189 **Traveling Water Screens**—Bulletin 885 describes company's traveling water screens for use in power stations and water treatment plants. Demonstrates how these screens remove destructive floating debris and suspended matter from water by straining them from the influent channel. A drawing, complete specifications and a data form for estimating purposes are included. The Jeffrey Mfg. Co.

OTHER EQUIPMENT

190 **Lifting Magnets** — Eight-pp Bulletin 35-C illustrates and describes company's permanent magnetic separation and transmission equipment. Provides detailed specifications and application information on circular and rectangular lifting magnets and includes cutaway diagrams illustrating construction. Stearns Magnetic, Inc.

191 **Handy Product Guide**—Arranged for quick and easy reference to this company's products is the 48-pp Booklet 888, a revised version of a similar product guide. Featuring many photos with brief captions, it gives a plant engineer a quick look at what's available. Mechanical power transmission equipment, elevating and conveying machinery, feeders, crushers and pulverizers, separators, bin valves, foundry equipment, and coal handling equipment are among products shown. The Jeffrey Mfg. Co.

192 **Adhesive Bonding**—Featuring illustrations of several typical adhesive applications, this 8-pp booklet is devoted to factors which complicate the specifying of bonding materials and processing techniques; why optimum results may not be obtained, and the proper approach to selection of the correct formulation and process for a given requirement. Includes practical check list of points to consider in the selection of bonding materials. Rubber and Asbestos Corp.

193 **Building Machinery**—Twenty-pp Catalog 32-F presents a line of machinery for building and road maintenance. Provides ordering and application information on pug mill mixers, concrete vibrators, trowelers, tar kettles and asphalt heating kettles, kerosene torches and burners. White Mfg. Co.

194 **Coloring Anodized Aluminum**—Recent developments on coloring anodized aluminum are compiled in this 6-pp brochure. Covers such subjects as types of finishes possible and versatility of anodizing methods; peculiarities of dyestuffs, their properties and behavior patterns; choice of alloy in relation to appearance of finished product; surface preparation

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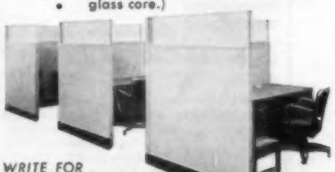
*(surface area, 15% perforations exposing acoustical spun glass core.)



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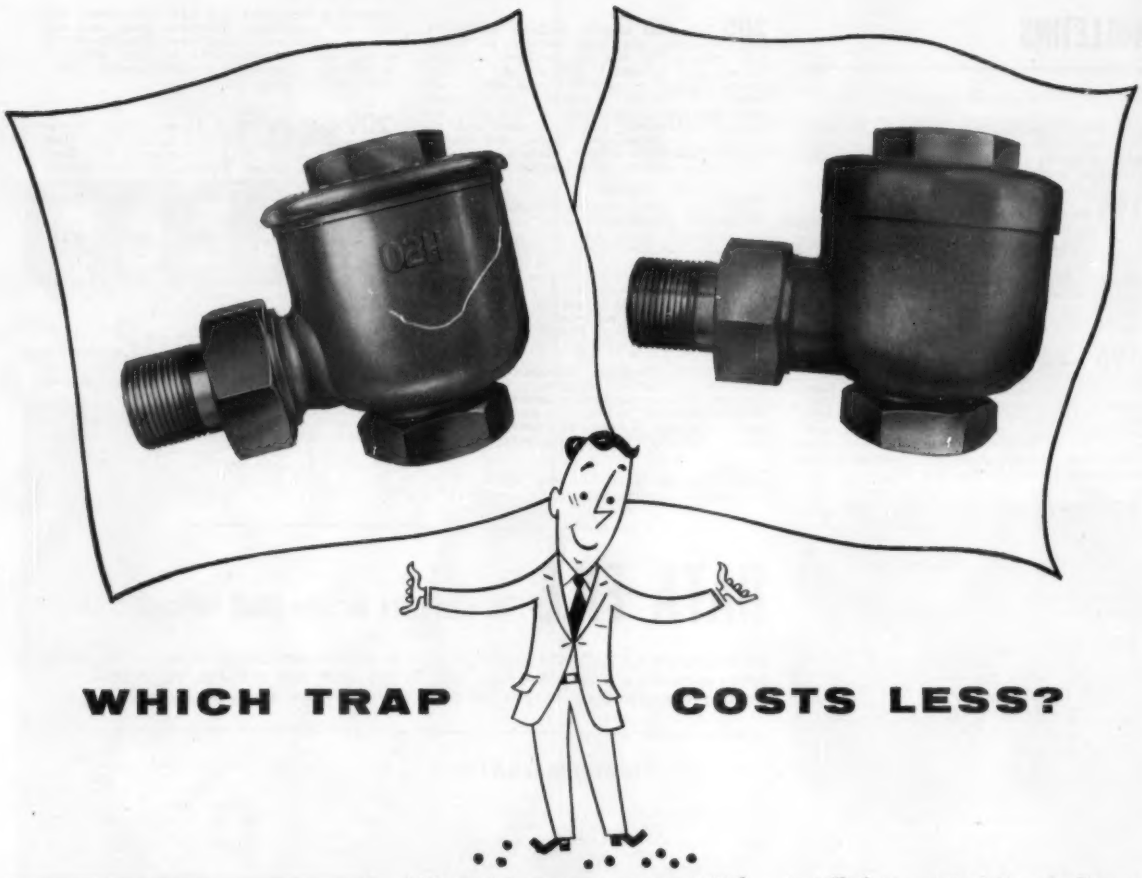

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Webster Heating experience includes the field of vacuum, vapor and low pressure steam heating of buildings . . . medium pressure steam in industrial and process heating applications . . . and hot water heating systems for all types of building. Webster's specialized experience is available to you at the Home Office and through Representatives in 65 cities across the nation.

Add maintenance cost to initial cost; divide by the number of years of service, and you have a true basis for cost analysis. Do this with Webster Radiator traps and you'll find that costs are amazingly low. Here's why . . .

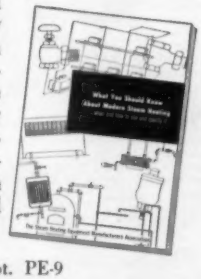
Webster Radiator Trap installations customarily give 15 to 30 years satisfactory service. A survey showed that 51,816 Webster traps in service averaged 30.3 years of service and were still going strong. Furthermore, in six installations, it cost less than one cent per year to maintain a Webster Trap. The average of 16 installations was only 2.8c per year.

No wonder a Webster Trap is a low cost trap. But in addition . . .

Webster traps save fuel, prevent steam loss, hold steam in the steam-using equipment until all useful heat has been radiated.

And, after years of service, when a Webster trap does show signs of wear, reconditioning is inexpensive and is readily accomplished. Webster Trap Attachments can be installed in original trap bodies — in almost all cases without "breaking" radiator connections.

"What You Should Know About Modern Steam Heating" is the title of this new booklet of interest to engineers. Write on your letterhead for your copy.



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BULLETINS

(Begins on page 21)

and effects obtainable; anodizing conditions and control; dyeing procedure. Chips of most-used colors are provided in the booklet. Sandoz Chemical Works.

195 Behind Closed Doors—Bulletin 55, 16-pp, contains a brief history of restroom fixtures from the first siphon-trap type water closet of 1775 to the complete assembly of off-the-floor fixtures found in today's washrooms. Illustrated and described is a typical modern restroom with seven recommended design features. A discussion of minimum code requirements is included. J. A. Zurn Mfg. Co.

196 Pressure Generators—Bulletin 755 features pressure generators designed to produce hydrostatic pressures as much as 500 times greater than normal plant air supplies. Complete information includes overall capacity pressure ranges, theory of operation and application details in high pressure synthesis, metal fabrication, hydrostatic testing, and high pressure bottle filling. Milton Roy Co.

197 Cut Nails—This practical new 12-pp edition of manufacturer's brochure on La Belle cut nails describes and pictures flooring and finishing nails, furring and cornice nails. Includes comparison of strengths between cut nails and wire nails; also gives information on packing and provides prices. Wheeling Corrugating Co.

198 Sprayers and Dusters—Catalog U-56, 20-pp, describes a remodeled line of sprayers, dusters and allied products. Sprayers are for applying insecticides, disinfectants and germicides in locker rooms, wash rooms and other areas. Two models of flame burners are also listed for burning weeds around plant fences, for portable quick heating. Full specifications, including sizes, capacities, and colored illustrations of latest units are included. Eight models of compressed air sprayers are detailed. Universal Metal Products Co.

199 Insulation Block With Ceramic Finish—Bulletin DF-100 describes Duraface Foamglas, a material which combines insulation and integral finish in a single block. Discusses manufacturing process, lists physical properties and details sizes available. Pittsburgh Corning Corp.

200 Mechanical Seals — Technical data on company's line of Mechanipak seals for rotary shafts are presented in this 6-pp bulletin. Describes important features of design and operation, includes cutaway views of the seals, and lists full specifications. Several specification forms are inserted. The Garlock Packing Co.

201 Hydraulic Accumulators — Piston-type accumulators and pre-charging accessories are shown in 8-pp Catalog 1536. Gives features of the accumulators, also specifications. Provides nomographs for selecting capacity needed. Also included are instructions for installation, precharging and maintenance. Industrial Hydraulics Div., The Parker Appliance Co.

202 Reducing Camera — How reduced-size photos made with company's continuous-flow reducing camera save reproduction materials, speed up print production, facilitate assembly operations, and save filing space, postage and shipping costs is told in the 8-pp illustrated brochure. Gives operating instructions and specifications, including clearances required, for the camera and the special continuous processing unit designed for use with it. Peerless Photo Products, Inc.

203 Water Tube Boilers—This 12-pp bulletin describes and illustrates various types of water tube boilers and auxiliaries, including water cooled furnaces, superheaters, economizers, air preheaters, and steam washers. Also contains diagrams, tables, and boiler data. Edge Moor Iron Works, Inc. Div. of Condenser Service & Engineering Co., Inc.

204 Treatment for Burns—Bulletin 0402-3 describes company's Foille burn kit for immediate treatment of all types of burns. Points out advantages of the aerosol spray technique for quick application of the Foille antiseptic to control pain, mitigate shock, and help preserve tissue. Mine Safety Appliances Co.

205 Industrial Mixers—Bulletin R-1701-B1, 8-pp, discusses six basic factors in buying large mixers for use in fertilizer, chemical, ceramic and industrial applications. Information is included on correct mixing action; uniformity of batches; conversion of automatic batch operation; importance of dust-proof operation; maintenance and repair costs and, importance of installation space. An outline drawing illustrates typical mixer and a chart lists various models. Worthington Corp.

206 Fast Silver Plating—Features and advantages of a high-speed silver plating process for industrial applications are given in this bulletin. Primarily a technical write-up, this folder contains information on bath preparation and maintenance, procedure for determining metallic silver content in potassium silver cyanide, and includes a plating time table for specific thickness requirements. Also describes a brightener. Sel-Rex Precious Metals, Inc.

207 High Pressure Equipment — Catalog 2055, 26-pp, describes company's line of high pressure valves, adaptors, reactors, autoclaves, thermo-couplings, gages, fittings and tubing. Includes photos of items, diagrams, and dimensional data. High Pressure Equipment Co., Inc.

208 Sawmill Needs—Catalog 148-A, 24 pp, on sawmill equipment, contains sections on conveying equipment, log haul equipment, and woodmill equipment. Provides model and on-the-job photos and includes specifications charts giving complete dimensions for easy selection. Installation information is also included. Electric Steel Foundry Co.

209 Improved Blast Room — How downdraft ventilation is provided in the Vacu-Blast room with waffle floor is explained and illustrated in this folder. Pictures an above-ground installation, and includes full specifications. Vacu-Blast Co., Inc.

210 Quenching Oil—Technical Bulletin 37 describes a high quality low cost quenching oil, including table showing advantages of various degrees of oil agitation, and a graph showing how the quenching oil compares with another compounded oil. Sun Oil Co.

211 Stress-Rupture Data — Of interest to plant engineers concerned with stainless tubular products in steam superheaters, heater coils in oil refinery heaters and petrochemical plants and high-temperature piping installations, this data card gives stress rupture properties of chromium-nickel stainless steel weld deposits. Based on a study of high-temperature rupture properties of stainless weld metals, the card gives a quick summary of results. The Tubular Products Div., The Babcock & Wilcox Co.

DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 215-216.

SPACE, PROCESS HEATING

301 Unit Heaters — Bulletin 7517, 48 pp, presents full information on latest design of this company's Venturafin unit heaters for steam or hot water applications. Gives features of construction, general engineering data, capacity tables. Fully illustrated with photos of horizontal and vertical models, dimensional drawings and piping diagrams, booklet includes tips on the use and selection of unit heaters. American Blower Corp.

302 Plumbing, Heating Supplies—Edition G is the current edition of this company's 118-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

303 Forced Air Space Heaters—Illustrated Bulletin 523-B, 12-pp, is devoted to a line of forced air heaters for comfort heating, year-round ventilating, tempering make-up air, process drying and heat curing. Explains design efficiency, construction details, operating principles and flexibility of application. Advantages of the heater are detailed. Dravo Corp.

304 Unit Heaters — Catalog 155, 32 pp, presents unit heaters for steam and hot water in vertical and horizontal delivery and power-throw types. Covers design features and provides performance and capacity data. Also provides information on unit heater selection, sound ratings, locating unit heaters, motor wiring and control. Piping and installation suggestions are included as well as typical unit heater specifications. Modine Mfg. Co.

306 Unit Heaters—Publication B-1720, 24 pp, introduces a line of propeller fan heaters suitable for both steam and hot water. Design and construction features of the heaters are explained and illustrated. Basic steam and hot water capacities are tabled and information on selection of steam and hot water units provided. Booklet also gives mounting suggestions, includes piping and wiring diagrams, dimensional details. The 24 sizes in this line range from 63 to 1395 sq ft EDR basic steam ratings. Warren Webster & Co.

307 Electric Heat, 101 Ways—Principal industrial heating applications and methods are described in "101 Ways to Apply Electric Heat," a 32-pp booklet. Illustrated case histories show how metal-sheathed electric heating units are being used. Physical aspects of installation are detailed along with a discussion of the problem, solution and advantages obtained. To illustrate liquid heating, diagrams and photos show best applications for the elements and heaters. Similar treatment is accorded problems of heating air and gases; melting soft metals and viscous materials; and heating machinery and equipment parts. A section is devoted to far-infrared heating. Edwin L. Wiegand Co.

308 Industrial Ovens — Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry source of heat, selection of heater, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

309 Industrial Ovens — Thirteen types of company's Conventioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

ELECTRICAL

310 Variable Speed Motors—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls; etc. U. S. Electrical Motors, Inc.

312 Industrial Electric Motors — Bulletin N-100 presents technical data on company's Series 100 electric motors. Includes table listing frame sizes, dimensions, schematic drawings showing operation. Howell Electric Motors Co.

311 Motor Buying Guide — Bulletin GEC-1026, 28-pp, features company's standard a-c fractional and integral horsepower motors in most general use. Included are general- and definite-purpose, fractional horsepower motors, and fhp gear motors. A section on selection of integral horsepower motors covers horsepower requirements, enclosures, starting current limitations, speeds, motor types, and selection of fuses and circuit breakers. Descriptions

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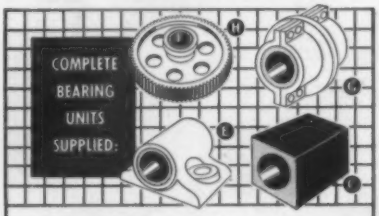

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DATA FILE

(Begins on page 220)

and specifications cover single-phase, polyphase, totally enclosed fan cooled, and gear-type integral horsepower motors. Photos, ratings, dimensions, weights, frame numbers, and modifications included. General Electric Co.

313 Polyphase Motors — Bulletin 103 provides design features of company's Loadstar polyphase motors conforming to new NEMA standards and also gives tabulated information on the changeover. Open drip-proof and totally enclosed fan cooled motors are covered. Photos show construction details. Leland Electric Co.

314 Motor Starters — Booklet 1062, 16 pp, describes motor starters having short circuit protection for 2200- to 5000-v systems. Illustrates starters using company's 50,000 kva interrupting capacity type HS contactor; also starters which will safely interrupt the circuit from a bus of unlimited capacity. Indoor and outdoor installations are pictured. The Electric Controller & Mfg. Co.

315 FHP Manual Starters—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them. Square D Co.

316 Toggle Switch—Catalog 73a, 12 pp, covers 19 precision snap-action toggle assemblies and more than 90 AN and JAN approved designs, including assemblies that will control from 1 to 24 separate electrical circuits. Contains dimensions, operating characteristics, electrical ratings, contact arrangements on each switch, and an illustration of one representative switch from each group of switches. Gives general information on each "family" of switches which are designed for low voltage d-c applications. Micro Switch Div., Minneapolis-Honeywell Regulator Co.

318 Switch Wiring Diagrams—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one useful feature. Includes key to electrical symbols used. Allen-Bradley Co.

319 Commutator Slip Ring Maintenance—This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their corrections; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

320 Finding Fault Grounds—This 32-pp illustrated booklet covers use of the Allen ground detector in the detection and location of electrical fault grounds. Separate chapters cover grounded vs ungrounded systems, operating instructions, explanation of misreadings encountered, complete cancellation, detection of fault grounds in lead-covered underground cable, tracing buried and/or hidden elements. Excel Electric Service Co., Inc.

322 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

324 Electrical Conduit—This 8-pp bulletin, Form 646, describes company's heavy-duty, rigid steel electrical conduit, reproducing test data sheets to show how the protected conduit stands up under corrosive attacks of salt spray, sulfuric acid, caustic soda, and exposure to excessive heat. Four-color photos illustrate the effects on this and other conduit after exposure to attacks listed above. National Electric Products Corp.

326 Trolley Busway Systems — Three new bulletins offer real help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electric equipment. Bulletin 35 (28 pp) covers 225-500 amp systems; Bulletin 40

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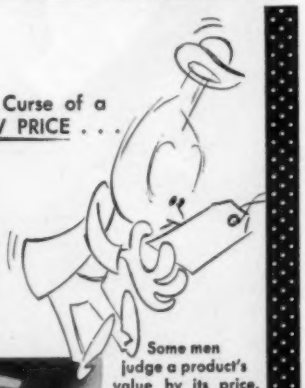

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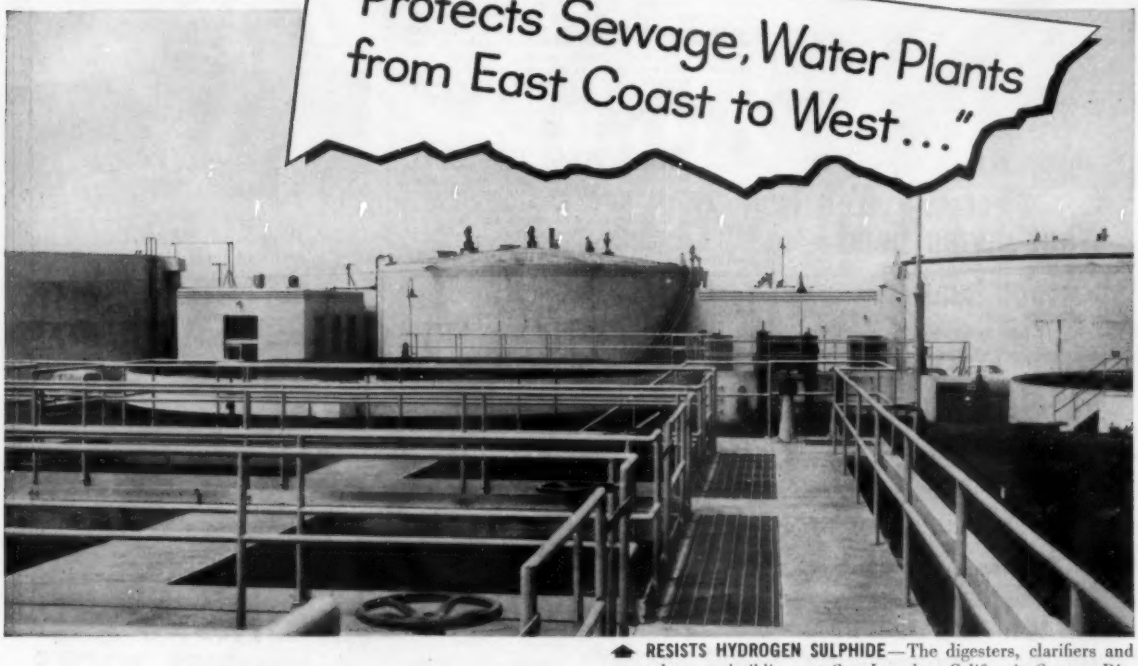

RESISTS HYDROGEN SULPHIDE—The digesters, clarifiers and control pump buildings at San Leandro, California Sewage Disposal Plant are protected with Ramuc masonry paint, a Parlon-based product of Inertol Co., Inc., Newark, New Jersey. After two year's exposure to sea, sewage fumes, and hydrogen sulphide fumes, the finish is still intact.

Possibly nowhere else are maintenance paints subjected to more continuous abuse from the elements and chemical fumes than in water and sewage treatment plants. Parlon-based paints have shown their ability to withstand such punishment where all other protective coatings have failed.

Whether the challenge comes from sewage fumes or salt sea air, hydrogen sulphide or ferric chloride—paints based on Hercules Parlon (chlorinated rubber) have shown their ability to take it. For beauty and protection at attractive long-term costs, you can depend on Parlon-based finishes. For further information, contact your paint supplier, or call or write directly to:

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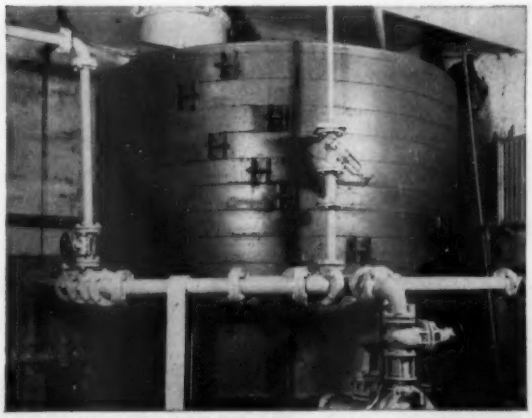

... AND FERRIC CHLORIDE—This 3,500 gal. ferric chloride storage tank in the vacuum filter plant, Back River Sewage Works, Baltimore, Maryland is covered with three coats of red Rubalt RA paint based on Parlon, manufactured by Alfred Hague & Company, Brooklyn, New York. Parlon finish was only one found able to resist corrosive effect of ferric chloride, which is so strong that it will eat away bare metal or concrete. Tanks are wood with rubber liner.

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DATA FILE

(Begins on page 220)

(44 pp) 100 amp systems; Bulletin 45 (40 pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting and equipment descriptions. Feedrail Corp.

328 Handbook on Storage Batteries—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

329 Battery Manual—Battery selection techniques are emphasized in 20-pp Bulletin 210, a revised edition of this manufacturer's manual on storage batteries for stand-by power, emergency lighting and switchgear applications. A discussion of charging equipment and simplified battery maintenance procedures is included. Storage battery installation procedures are described and illustrated by photos. Exide Industrial Div., The Electric Storage Battery Co.

LIGHTING, COMMUNICATION

330 Fluorescent Lighting—This 24-pp fluorescent lighting guide book is a reference digest on fluorescent products. Gives advantages of this type of lighting; summarizes various lamps and parts, including starter sockets, lampholders. Includes reference chart for lamp performance when interchanged with typical ballasts. Tabulations include seven shades of "white" lamps. Ordering details included. Sylvania Electric Products Inc.

331 Lighting Fixtures—New Section K of Condulet Catalog 3000 describes components, performance data, and methods of relamping for any of the manufacturer's new EV series explosion-proof and weather resistant lighting fixtures. It contains illustrations showing steps for easiest relamping and installation of this type of fixture. Crouse-Hinds Co.

332 Guide to Luminaires — Pocket-size, 28-pp Bulletin B-5799-BB covers fluorescent luminaires for industrial and other use. Summarizes salient features of each type of luminaire as it discusses electrical characteristics, maintenance and mounting data, details of construction, dimensions, and recommendations for application. Also contains a pictorial guide to floodlights and incandescent luminaires for industrial and other use. A 4-pp tabulation of buying data concentrates information needed for procurement. Westinghouse Electric Corp.

333 How to Use Sound Signals—This new 44-pp combination manual, data book and catalog is an excellent reference work on industrial sound signals. Includes a simplified explanation of fundamentals of sound; a glossary of sound and signal terminology; a quick-comparison guide for selecting equipment; suggested steps in choosing a signal installation, and hints for compiling a code signal call system. Benjamin Electric Mfg. Co.

334 Television Equipment — Twenty basic applications for "TV Eye" low-cost closed circuit television equipment are described and pictured in Form 3R2335. Folder explains equipment's functions and operation, lists specifications. Radio Corp. of America.

MECHANICAL POWER TRANSMISSION

335 Flexible Couplings — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

337 Roller Chains, Sprockets—Catalog 754, 64 pp, describes, illustrates a line of roller

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Handle more cars better — spend less to install and maintain with Relayers from Foster. "Open-stock" shipments from Foster warehouses, all sections 12# thru 175# — plus Switch Materials and Track Equipment items.

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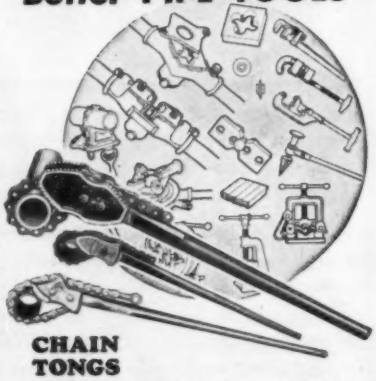

CHAIN TONGS

"Reversible," "Standard" and "Ideal" types in all sizes. Jaws are drop forged from special steel, are carefully milled, heat treated, hardened and tested. The Handles are forged spring steel. The Chains are proof-tested to ⅔ catalog strength (1,200 lb. to 40,000 lb.). "Reversible" Jaws give double jaw life. 'Standard" Jaws have extra bearing on the handle and forged-in chain guides. The "Ideal" Tongs have V shaped teeth for a sure grip on irregular shapes—fittings, etc.

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NO AIR PRESSURE NEEDED! Type EVA *contains* the explosion rather than preventing it: no "pumping up" required. Re-lamp right in hazardous areas: just switch off circuit, unscrew globe holder and replace lamp. No pressure switch to fail and create possibilities for hazard. Low initial cost and simple maintenance will mean sustained performance at top economy with these new Crouse-Hinds lighting fixtures.

200 W; with or without guard or reflector; overall length, 13 3/16".

Complete, explosion-proof lighting installations for acetylene & hydrogen areas!

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UL Approved for Groups A and B Locations

- The first complete lighting system designed and UL-approved for Class 1, Groups A & B, as well as C & D hazardous locations.
- New lighting fixture can be re-lamped even in the presence of combustible gases: gas-tightness not required for its safe performance.
- Heavy, shock-resistant construction withstands pressures from internal explosions without rupturing.
- Flame-tight joints prevent escape of flame to flammable atmosphere.

Whether you're installing a complete explosion-proof lighting system — or merely converting a few of your Group C or D fixtures to these safer Group A's — Crouse-Hinds provides greatest safety and economy. See your Crouse-Hinds distributor, or write us.

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Let the fast lifting power of the "Series 700" 'Load Lifter' Electric Hoist cut your load-handling costs. With this efficient hoist, one man can lift a ½-ton load a foot a second — at the push of a button.

The 'Load Lifter' is a heavy-duty hoist. It has extra-strong heat-treated helical gearing. The load and motor brakes are synchronized, yet each brake alone is powerful enough to hold the full load safely. Extra safety is provided — only 24 volts at the push button. Performance is smooth — ball bearings throughout minimize friction drag and wear.

Put new economy into your operations. The "Series 700" 'Load Lifter' is available in capacities from ½ ton up. Single and two-speed control. Ask your "Shaw-Box" Distributor for details or write for Bulletin 410.

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ELECTRIC HOIST

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Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Microsen' Industrial Instruments, and Aircraft Products.

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DATA FILE

(Begins on page 220)

chain stock sprockets, including minimum Lore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

338 **Sprocket Roller Chain**—Bulletin A-624 24 pp, is compiled to provide plant engineers with all data required for selecting and ordering roller chain and sprockets. Devotes a page to Taper-Lock sprockets for each size of chain from 40 to 100, giving sectional drawing, dimensions, number of teeth, maximum stock bore available, weights, prices and other data. Another page covers Taper Lock bushings; and full information is given on riveted and cotter-type roller chains. Dodge Mfg. Co.

339 **Improved Motor Pulleys**—The complete redesign of his company's standard line of Vari-Speed motor pulleys is described in 28-pp Bulletin V-545. Replete with illustrations, some in full color, this booklet covers construction details, lubrication, controls available. Provides instructions on how to select proper unit, complete rating tables and dimensional diagrams. Also includes data on the Vari-Speed Jr. Reeves Pulley Co.

340 **Adjustable V-Belt**—This 8-pp catalog covers company's new Veelos TD and TE V-belt designed to reduce installation and operation costs on big drives. Studs, cup-washers and T-screws of the belt are illustrated, and installation and operation characteristics explained. Booklet includes directions on how to measure, to couple and uncouple, and to install. A table shows correct lengths for these belts. Manheim Mfg. & Belting Co.

341 **Improved V-Belts** — This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.

AIR CONDITIONING AND DUST CONTROL

343 **Improved Dust Filters**—Sixteen-pp Bulletin 528-R gives information on continuous-automatic dust filters available housed or unhoused for use on pressure or vacuum. Explains principle of cleaning the filter cloth with high pressure reverse jet air, and tells where these filters are being used. Provides comparative test data on these and other type filters; discusses industrial dust control service offered and diagrams some installations. Self-adjusting blow rings furnished with these filters are discribed in detail. The Day Co.

345 **How Conditioning Units Can Help**—The advantages of self-contained units in cooling, dehumidifying, cleaning are cited in 40-pp Catalog 1307. Explains installation, operation. Provides data on direct expansion and cold water cooling and on hot water and steam heating. Clarage Fan Co.

346 **Dust Control, Blast Cleaning**—Bulletin 1210, 24 pp, fully illustrated, describes manufacturer's line of blast cleaning and dust control equipment, accessories. It is indexed according to equipment, type and purpose. Lists three methods of abrasive application. Pangborn Corp.

347 **Manual of Exhaust Hood Design**—Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of dust control installations show various methods of hooding dust source. American Air Filter Co., Inc.

348 **Dust Control Systems**—Valuable engineering data on methods of dust control as well as descriptions of company's line of dust collectors are contained in illustrated Bulletin 636-2. Specifications on all models are included. A special section tells how to design your own system. Aget Mfg. Co.

349 **Air Conditioning Filters**—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters for the removal of air-borne impurities given. Dollinger Corp.

FANS, BLOWERS

351 **Industrial Fan Catalog**—Of interest to plant engineers requiring quick, accurate selection of industrial fans for specified capacities, 28-pp Bulletin EX-531 contains selection tables from which correct fan for required capacity can be determined. Complete descriptive information, detailed capacity tables and dimensional data are included. Introduces a new fan offering improved efficiency. Bayley Blower Co.

353 **Induced Draft Fans**—Eight-pp Bulletin DB-32-53 provides engineering information on manufacturer's Bifurcator fans for providing controlled draft for boilers and furnaces. Gives construction details, sizes. Illustrated with photos, diagrams of suggested methods for installation. DeBothezat Fans Div., American Machine and Metals, Inc.

354 **Utility Blowers**—Dimensions, specifications, and performance data on non-overloading utility blowers with backward curved blades are presented in concise form in 48-pp Bulletin BC-11. Covers belt-drive and direct-drive models. Also company's Arrangement 2 utility blowers, and Arrangement 3 blowers available either single width, single inlet, or double width, double inlet. Hartzell Propeller Fan Co.

355 **Standard Duty Fans**—Design and construction details of company's line of standard duty fans are covered in 28-pp Bulletin 543. Points out advantages, shows arrangement and application, describes accessories. Tables list material specifications. The New York Blower Co.

VALVES, TRAPS, PIPING AND ACCESSORIES

356 **Choosing the Right Valve**—Presenting valve selection as a matter of matching the valve's service characteristics with the service requirements of the job, this practical 20-pp booklet explains and illustrates basic design features of gate, globe and check valves. It tells in non-technical language, how each of these valve types works, and where it is best suited for use. Disc, stem connection, bonnet and bonnet-joint characteristics are also discussed and stem-operation is treated. Crane Co.

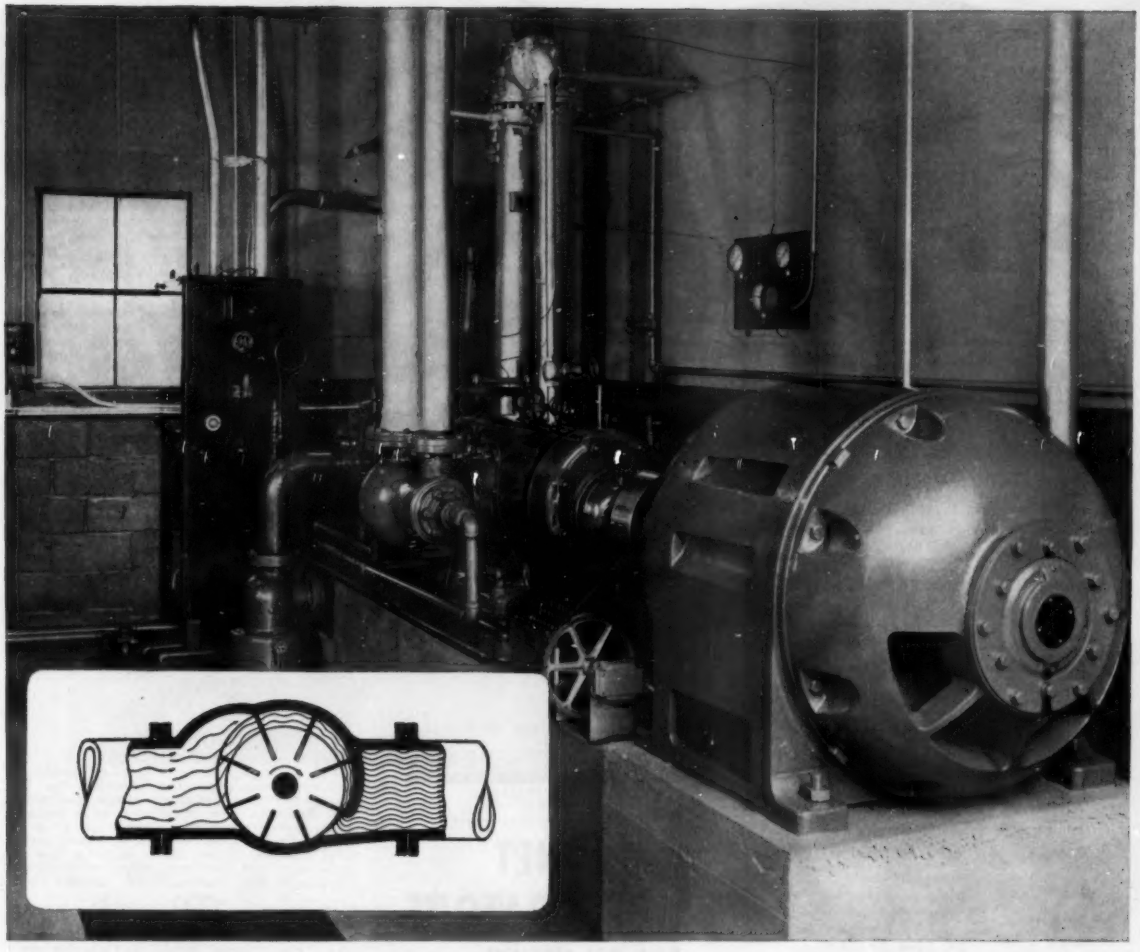
357 **For Quick Valve Selection**—Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated, includes pressure-temperature chart. The Ohio Injector Co.

359 **Automatic Regulators**—Illustrated information on 12 basic control valve types used in chemical process industries, power generating facilities, and in liquid or gas pressure control applications requiring precise instrumentation by automatic regulators is presented in this bulletin. Reducing valves, pump governors, relief valves, temperature regulators, float valves, damper regulators, combustion control valves, and boiler feedwater regulators are among the items treated. Atlas Valve Co.

361 **Butterfly-Valves** — Construction details, engineering and application data on butterfly valves are provided in three illustrated bulletins. Eight-pp Bulletin 557 covers those of standard heavy-duty construction; Bulletin 558, 8 pp, those of standard medium-duty construction; and Bulletin 559, rubber-lined butterfly valves. W. S. Rockwell Co.

363 **Pressure Reducing Valves**—New 6-pp Bulletin W-3 completely describes G-A cushioned water pressure reducing valves, which automatically reduce an existing high pressure to a predetermined low pressure. The installation, operation, adjustment, servicing, and specifications are fully covered. Golden-Anderson Valve Specialty Co.

364 **Bronze Valves**—Globe and angle bronze valves with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. Walworth Co.



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DATA FILE

(Begins on page 220)

366 **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for steam, air, gasoline, pressures up to 1500 lb. separators. W. H. Nicholson & Co.

367 **Steam Trap Book**—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all equipment; a maintenance section. Armstrong Machine Works.

368 **Steam Trap Reference Manual** — Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure trap size and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

369 **Unions, Check Valves**—Illustrated Catalog 55, 24-pp, describes and provides ordering information on a line of forged steel unions and check valves. Socket-weld, high-speed, orifice, O-ring and other unions are included. Catalog provides service recommendations, dimensions and list prices. Also included is table covering discharge of water to atmosphere. Clayton Mark & Co.

BOILERS

371 **Package Boilers**—This 12-pp booklet on package steam generators, describes the formulas behind all package steam generators, and illustrates how installation of a package steam generator can raise steam capacity in an existing boiler room without extensive structural changes. Shows plant operators how to make survey of their own steam requirements. Cyclotherm Div., National-U. S. Radiator Corp.

372 **For Lower Steam Costs** — "Have you Checked Your Steam Costs Lately?" is a 16-pp, non-technical picture and caption presentation; it serves to focus attention on high-cost features of antiquated boiler equipment. The first part of the booklet emphasizes typical boiler plant problems. The latter part illustrates packaged automatic boiler installations in industrial plants, others. Orr & Sembower, Inc.

INSULATION

373 **Pipe Insulation**—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between—300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

374 **Insulating Material** — Ultrafine, a new thermal and acoustical insulation made of blown glass fibers, is the subject of this bulletin. Complete with photos of insulation in use and tables showing its efficiency, bulletin gives properties, principal uses, handling characteristics, thermal conductivity, and acoustical efficiency. Gustin-Bacon Mfg. Co.

376 **Improved Heat Insulation** — This 8-pp bulletin describes Super-Light 85% Magnesia for temperatures to 600 F, available in cement blocks, pipe sections. Twelve advantages of this lightweight insulation are detailed. Recommended thickness, physical characteristics, prices are given. Also included is information on combination coverings with Tempchek inner layer for temperatures from 550 to 1500 F. The Philip Carey Mfg. Co.

PUMPS, COMPRESSORS

379 **For Hazardous Liquids**—Catalog Section D, 12 pp, presents company's line of Underwriter rotary pumps for hazardous liquids. Both mechanical seal and deep stuffing box

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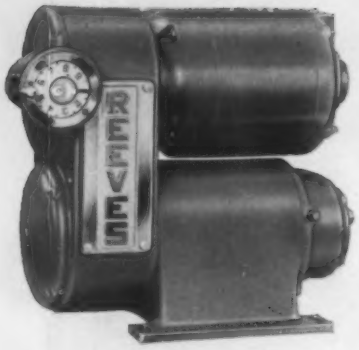

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DATA FILE

(Begins on page 220)

models are shown and dimensions and specifications provided. Various mounting arrangements and drives available for these UL approved pumps are also cataloged, and application suggestions are given. Also in this booklet are performance graphs, selection table. Viking Pump Co.

381 **Steam Pump**—Bulletin 230 describes a horizontal duplex steam pump with piston valve steam chest. Explains advantages of this construction, including high recovery of fuel cost when exhaust steam is utilized. Provides sectional and exterior views of the pump, also specifications, capacities and dimensions. Warren Steam Pump Co., Inc.

382 **Rotary Pumps**—This bulletin gives information and volumetric displacement specifications for heavy duty industrial pumps for tough applications, including handling paints, acids, hot varnish, paper pulp, most abrasive slurries, solvents, plastics. Bump Pump Co.

To order these catalogs circle item numbers on the handy Reader Service Cards provided on pages 215-216.

383 **On Vertical Pumps**—This 16-pp bulletin describes and illustrates application of vertical industrial service pumps for liquid transfer from short settings in both industrial and process services. Points out advantages and describes three basic designs. Stresses versatility of the pumps due to design flexibility. Also gives general recommendations for obtaining optimum performance, and includes photos of typical installations. Peerless Pump Div., Food Machinery and Chemical Corp.

385 **Compressors**—Bulletin A72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacities from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

386 **Portable Compressors**—Twelve-pp Catalog GG-9A pictures 40 models of company's portable type compressors. A quick reference chart shows capacities, engine types, and mountings available. Illustrates such features as: replaceable cylinder sleeves, interchangeable valve parts, aircraft type compressor cylinders, heavy duty industrial type engines, and magneto ignition on all gasoline models. Le Roi Div., Westinghouse Air Brake Co.

387 **Vertical Compressors** — Double-acting, motor driven vertical compressors are described as to distinctive features, regulation available, and construction details in 16-pp illustrated Bulletin 765-5. The improved cylinder design of these compressors and valve assemblies are discussed in detail. Booklet also describes air intake filters, air receivers, and aftercoolers available; and pictures some installations of the compressors. Chicago Pneumatic Tool Co.

PACKINGS, GASKETS

388 **Metallic Packing**—This folder is devoted to company's elastic metallic packing intended for frictionless operation by means of an oil seal. Photos and text tell how seal is constructed, used. A. W. Chesterton Co.

389 **Teflon Products**—Three new bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing, and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacket gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

390 **Packings for Chemicals**—Dura Plastic Teflon packing for sealing applications in the handling of corrosive chemicals is introduced in Bulletin 461 M. D. Stresses heat resistance of the material, chemical inertness. Discusses construction details and lists packings for use with specific chemicals. Durametallic Corp.

CONSTRUCTION

391 **Aluminum in Architecture**—This 32-pp booklet provides information on use of aluminum, and of special interest is a discussion on architectural colors for aluminum exterior surfaces. Also describes basic types of aluminum finishes—satin, sandblast, bright, and "as fabricated." There are drawings and details of copings and gravel stops; curtain wall products, including facings, panel assemblies and wall units; industrial roofing and siding, weatherside and underside fasteners; trim and molding; sheet, plate, foil, pipe, rod and bar stocks; and structural shapes. An alloy section lists mechanical properties of applicable alloys. Aluminum Co. of America.

392 **For Stairway Construction**—This 12-pp illustrated booklet describes the use of this company's Junior channels in stairway construction. Provides specifications and shows some of the buildings in which the channels have been used as stair stringers. Tables give size and weights, and show allowable loads. Jones & Laughlin Steel Corp.

393 **Basic Roofing Information**—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good conditioin. Discusses recommended roofing practices, essentials of a good re-roofing job, also special features of company's roofing materials. Johns-Manville.

394 **Pre-Mixed Mortar, Grout**—Bulletins are available on two recently introduced formula-

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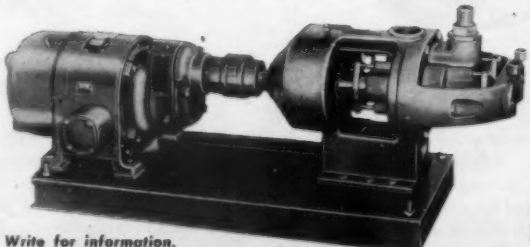

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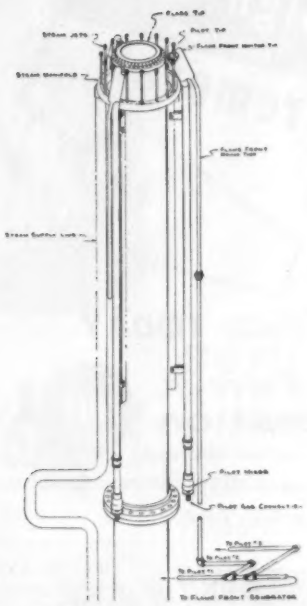

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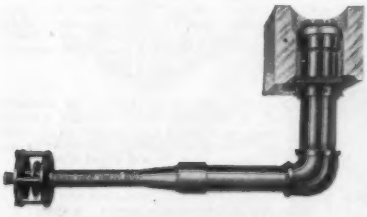

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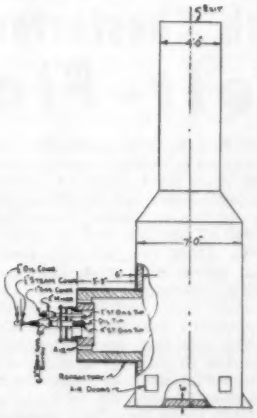

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(Begins on page 220)

tions—a non-shrink ready-to-use pre-mixed mortar and a pre-mixed grout, also non-shrink and ready-to-use. An 8-pp bulletin on this new grout discusses its use in grouting heavy equipment, gives procedures for mixing and placing and pictures some common methods of grouting and forming. Includes information on effect of temperature on setting time. The bulletin on pre-mixed mortar gives advantages and recommended uses. The Master Builders Co.

396 **Steel Grating and Treads**—Bulletin 2486, 16-pp, describes types, sizes and load characteristics of company's line of electroforged steel and interlocked aluminum grating and treads. Points out advantages in design and construction resulting in greater safety, pictures applications, and includes specifications, photos and diagrams. Blaw-Knox Co.

397 **How to Glaze with Plexiglas**—Sixteen-pp Booklet PL-23 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic Plexiglas. Written for plant engineers concerned with frequent breakage of windows or other glazing problems. Gives properties and behavior of this sheet. Plastic Dept., Rohm & Haas Co.

398 **Heat Absorbing Glass**—This 16-pp catalog describes Coolite, a glass designed to trap and absorb much of the sun's heat and to filter out annoying glare. Discusses types and thicknesses, gives light transmission data. Pictures many industrial installations and shows how conditioned natural illumination helps reduce operating costs. Mississippi Glass Co.

399 **Glass Block Fenestration**—The natural ventilation characteristics of glass block fenestration are presented in this illustrated report of a test project. In some 88 pages, report covers sun hoods, window types, dual outlets, air speeds, double loaded ventilation below window sill. Test data is summarized and recommendations included. Kimble Glass Co.

400 **Sound Absorbing Walls**—The advantages of Soundex walls and partitions are outlined in this 8-pp illustrated booklet. Includes photos, construction drawings, full specifications. GR Products Inc.

401 **Ceiling Diffusers**—Catalog F 6597, 28-pp, contains information on ceiling diffusers, and ceiling returns. The square and rectangular ceiling diffusers and returns are designed to match appearance of acoustical ceiling tile and provide an inconspicuous means of air distribution. Linear ceiling diffusers can be used for either supply or return air, with or without integral fluorescent light units. Catalog gives performance data. Barber-Colman Co.

402 **Translucent Structural Panels**—Bulletin 533, 12 pp, describes Resolite, a translucent structural material, corrugated or flat, molded of thermosetting polyester resins reinforced with woven glass fibers. Illustrates use of Resolite in partitioning, skylighting and decorating installations. Provides standard sheet specifications, general information on colors, weights, light transmission and thicknesses. Resolite Corp.

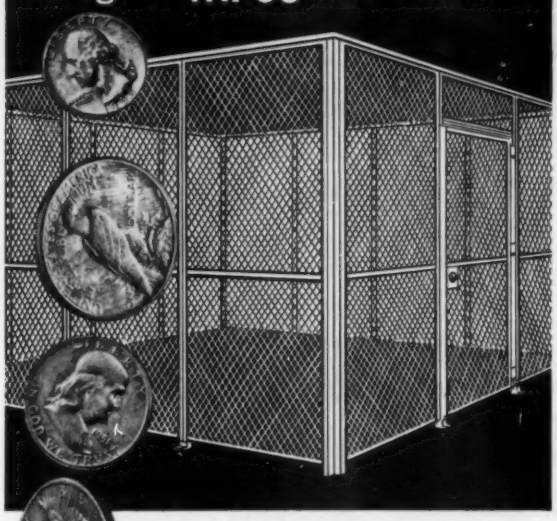
403 **Non-Slip Flooring**—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet A-5, 8 pp. Discusses safety features; gives fabricating data. Alan Wood Steel Co.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

405 **Data for the Shop**—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)

406 **Pipe Tool Ordering Guide** — Catalog 2-51, 8 pp covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

Change to WIPCO Wire Partitions



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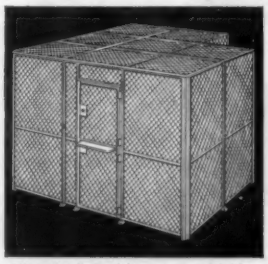

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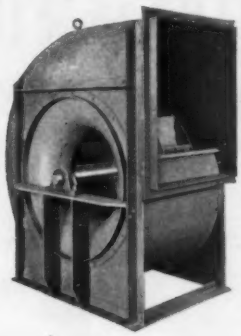

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Skillfully Engineered, Accurately Rated
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Two types of fan wheels. Housing dimensions remain the same but performance characteristics differ.

Forward Curve wheels offered from 7½ to 73 inch. Capacities up to 70,000 cfm.

Quiet operating, medium speed (IPL) wheels with non-overloading horsepower characteristics for heating, ventilating and air conditioning or industrial applications. Wheel diameters from 15 inch to 73 inch, with any speed or discharge required. Capacities up to 123,00 cfm. Class I, II, or III construction.

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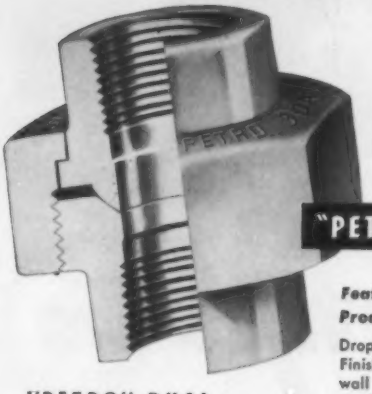

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Drop forged from uniformly heated solid bars. . . . Finished to American Standard A.A.R. . . . Uniform wall thickness and concentricity maintained through quality controlled production. . . . Precision machined seats plus a differential in hardness form a perfect seal and will not seize at high temperatures. . . . Octagon shaped ends and nut provide safety from and resistance to distortion by wrench abuse.

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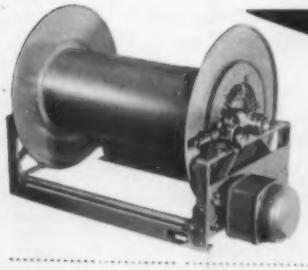

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DATA FILE

(Begins on page 220)

408 **Where to Use Your Stud Driver**—Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use for attachment of pre-drilled fixtures. Remington Arms Co., Inc.

410 **Flux Recovery Equipment**—How company's flux recovery equipment salvages valuable flux, saves man-hours, and speeds and improves welding is told in this 6-pp illustrated bulletin. Describes primary recovery installations. Invincible Vacuum Cleaner and Mfg. Co.

VIBRATION CONTROL

411 **How to Cut Vibration**—The use of Vibra-Mount felt in reducing machine vibration and accompanying noise is covered in this 20-pp illustrated booklet. Tells where this shock-absorbing felt is used effectively, how to select the proper mount, and how to install it. Cost information is provided, other felt products are listed. American Felt Co.

412 **Improved Machine Mountings**—Bulletin K4A, gives engineering specifications and performance data on vibration, shock and noise control products. Presents 11 types of vibration isolating units which utilize steel springs, rubber and cork—singly or in combination. Discusses merits of springs and organic materials and tells under which conditions the various media perform best. A selector chart shows recommended and alternate methods of isolation. The Korfund Co., Inc.

413 **Improved Machine Mounts**—This brochure describes advantages of company's leveling machine mounts. Tells how they enable installation and leveling of heavy machines without bolting or shims, afford increased plant mobility, reduce maintenance costs, and lessen noise. Barry Controls, Inc.

MATERIALS HANDLING

414 **Overhead Handling Equipment**—Booklet 2008-K, 12 pp, is the current edition of this company's engineering and application data booklet covering overhead materials handling equipment. Describes and illustrates track drives, cranes, electrification, buckets, grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

415 **Manual on Electric Hoists** — Catalog H-46, 40 pp, covers monorail and stationary hoists and car pulleys. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

417 **Electric Hoist Manual**—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists. Manning, Maxwell & Moore, Inc.

418 **Crane and Hoist Parts**—Bulletin G8 covers company's line of hoist grabs as well as component parts for various type cranes. Includes photos and drawings of the parts, along with descriptions and specifications. Downs Crane & Hoist Co.

419 **Portable Hoists**—This bulletin describes a lightweight air hoist in 2000, 1000, 500 and 300-lb capacities. Gives specifications, dimensions. Keller Tool Co.

420 **How to Choose a Crane**—Designed to aid in the selection of overhead cranes, 8-pp Unit 97 shows how to analyze handling problems, decide on the type of crane desired and draw up specifications for crane proposals. Basic data is provided on classes of crane service, crane ratings and capacities and recommended speeds for bridge, trolley and hoist, along with standard dimensions and clearances. Gives 14 safety features. Whiting Corp.

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Tank Gauge

- FOR GAUGING LIQUIDS OF ALL KINDS
- 100% AUTOMATIC
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Protect COMPRESSED AIR TOOLS

With Armstrong Air Traps!

MOISTURE in air lines washes out the lubricant in compressed air tools, causes excessive wear and corrosion. For maximum protection against moisture damage install one of three types of Armstrong Air Traps on aftercoolers, separators, receivers and at low points on air lines.

No. 71 Snap Action Trap

1. The Armstrong No. 71 Snap Action Air Trap is the ideal answer on many systems. The valve opens and closes with a snap—no dribbling, no hunting, not held open by small dirt particles. Can't leak costly air and no priming is necessary. Cast body for pressures to 250 psi, forged steel to 1000 psi.

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3. The Inverted Bucket Type Trap (in several sizes) is the only air trap manufactured suitable for severe dirt and oil conditions; is frequently recommended for inter-cooler drainage on two stage compressors where considerable oil is encountered.

All Armstrong Air Traps are unconditionally guaranteed to give satisfaction. WRITE FOR BULLETIN 207. ARMSTRONG MACHINE WORKS, 912 Maple St., Three Rivers, Mich.

ARMSTRONG Air TRAPS

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NEW

Speeds and Capacities Give Wider Range of Usefulness

Keller Air Hoists are now available with new gearing, and in link chain models to provide greater versatility of application.

MODEL	CAPACITY	SPEED	WEIGHT
86-2V20	2000 lb	19 fpm	78 lb
86-2V20L*	2000 lb	19 fpm	78 lb
86-2V10	1000 lb	35 fpm	78 lb
86-1V10	1000 lb	19 fpm	28 lb
86-1V10L*	1000 lb	19 fpm	28 lb
86-1V5A	500 lb	35 fpm	28 lb
86-1V3	300 lb	80 fpm	28 lb

*Models with link chains

KELLER AIR HOISTS HAVE THESE ADVANTAGES:

- **CANNOT BURN OUT** from overload or extended stalling
- **LIGHT WEIGHT** in relation to its capacity . . . easy to move and hang
- **LOW MAINTENANCE** . . . rugged air motor is not affected by dust or fumes
- **CONTROLLED SPEED** . . . from a creep to maximum aids spotting of load

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Supply Air Control

- For applications where large quantities (fixed amounts) of outdoor air must be supplied at comfortable temperatures — paint spray booths, manufacturing areas, etc.
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- Coiled air bulb assures proper temperature of air at fan discharge

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THIS IS LOW COST WELDING!

When a touch on a button moves weldments like these into the correct, most convenient position for a downhand pass, you get more arc time, more welding at lower cost C-F power operated Positioners, rotate the work in a full circle at any point in a range of 135° from the horizontal—giving welders a choice of an infinite number of downhand welding positions instantly.

Every requirement for faster, better positioned welding—constant or variable speed table rotation, full 135° tilt, self-locking gearing which holds the table in any position oversize built-in main tilt and rotating bearings, choice of two base styles, and many other features—are built into C-F Positioners.

C-F Positioners are available in Hand or Power operated models, and are made in capacities up to 30,000 lbs. and larger.

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CULLEN-FRIESTEDT CO., CHICAGO 23, ILL.

C-F positioned welds mean better, more economical welds

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DATA FILE

(Begins on page 220)

421 **Industrial Lifts**—This booklet presents a wide range of elevating equipment designed to step up efficiency and cut handling costs. Covers dock lifts, crossover bridges, sidewalk elevators, service lift. The Wayne Pump Co.

422 **Sheet Lifter** — Operational and design features of company's sheet lifting equipment, which contributes toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16-pp. Cullen-Friestedt Co.

423 **Hoisting Equipment**—Eight-pp Bulletin PU-50-1 presents this company's line of hand chain hoists, electric hoists, and trolleys, giving application suggestions, capacities, dimensional data and prices. Featured items include the Lodestar, an electric chain hoist with push button control, and the Comet, with pendant rope control, and the Meteor, a wire rope electric hoist. Brief data on cranes is provided. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

424 **Cranes for Big Jobs**—A new 1½-yard shovel, 35-ton crane is described in this 6-pp catalog. Action pictures of the machine in quarries and gravel plants are included, also specifications. American Hoist & Derrick Co.

425 **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conductor systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

426 **Freight Elevators** — Elevators designed especially for power truck loading are described in this 8-pp illustrated bulletin. Discusses various requirements for impact, offbalance, and extra static loading and shows how design and structure of company's elevators meet requirements. Otis Elevator Co.

427 **Casters and Wheels**—Catalog 138 is a 191-pp product manual on company's line of casters and wheels, describing design features and listing full specifications. Photos and drawings are used profusely to illustrate data, covering furniture casters, wheels, glides, desk shoes and various accessories. Darnell Corp.

428 **Conveyor and Elevator Belting Tips**—This 32-pp manual on installation, maintenance and care of conveyor and elevator belting, uses photos and drawings to show ways to improve belt service and lengthen belt life. Includes a discussion of belt design, covers, reinforcements and grades. Repair methods, splicing, and fastenings are also covered, and there's a table listing common conveyor belt maintenance problems with their cause and remedies. The B. F. Goodrich Co.

429 **Conveyor Trolleys** — A new line of ball bearing trolleys for overhead conveyors is covered in 20-pp Book 2536. Contains specification data for the selection of new trolleys, or of replacement trolleys for existing installations. Describes many features resulting in low operating and maintenance cost. Link-Belt Co.

430 **Metal Conveyor Belts** — This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belts; covers raised edge and flight constructions, chain edge construction, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

432 **Continuous Power Conveyor** — Sixteen-pp Catalog A-96 describes a packaged overhead conveyor for light duty applications. This complete basic "package" contains drive unit, takeup, oiler and other items essential for a 50-ft system. Describes power drive unit, track, power chain and other components and discusses lubrication and chain safeguards. Suggested layouts are diagrammed, and some installations of these conveyors are illustrated. Richards-Wilcox Mfg. Co.

433 **Sling Chain Handbook**—Illustrated Data Book 100, 32-pp presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams,

Anywhere you go

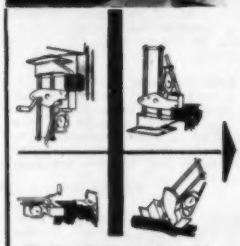
THE
KING PORTABLE
CAN GO TO MAKE
ACCURATE BRINELL TESTS

Accuracy guaranteed to well within ASTM requirements.

You can make accurate Brinell tests in the field, in the yard, factory, shop, warehouse and laboratory with the versatile KING PORTABLE. This precision unit soon pays for itself many times over because it saves handling and set-up time. In addition:

1. it puts a load of 3000 kg on a 10mm ball—other loads as required.
2. it has a narrow, shallow nose at the anvil and base to get into small, cramped spaces, tubes or cylinders.
3. it has a removable test head to test parts of any size.
4. it eliminates test bars—there's only one impression to read.
5. it is especially adapted for testing immovable parts or parts in assembled machines.

Ask for information on the many additional advantages you'll find so beneficial.



The King Portable can be used in any position—even upside down.

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DARNELL CASTERS & E-Z ROLL WHEELS

Darnell Casters and Wheels start cutting costs from the very first day of installation. With over 4000 types of casters and wheels to select from you can specify the exact model to meet your requirements.

Free Manual

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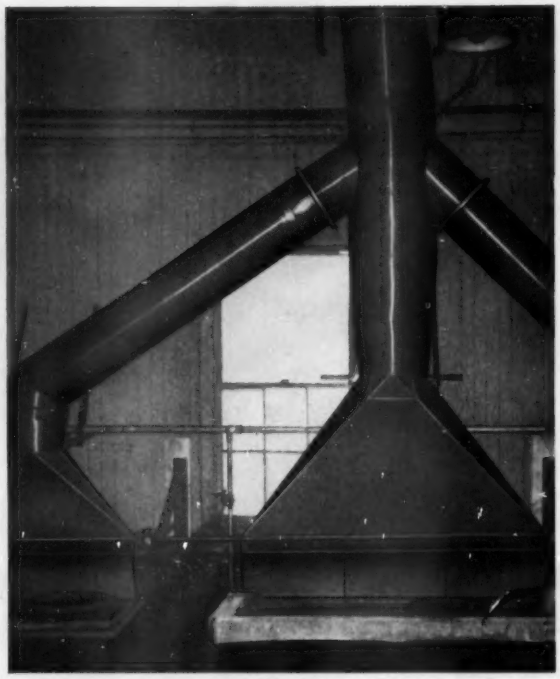

Out of many, one material only has successfully eliminated the problem of replacement at this exhaust duct system over corrosive acid fumes at Sargent & Company, New Haven, Conn. That material is Boltaron 6200. Fabricator: New Eng. Rack Co., Hamden, Conn.

CORROSION IS COSTLY...SAVE MONEY WITH *Boltaron* 6200

Here at Sargent & Company, as in so many similar installations across the country, Boltaron 6200 proves once again that corrosion can be licked, replacement eliminated. Perhaps this remarkable unplasticized polyvinyl chloride can help you. Check its many advantages.

Boltaron 6200 is a rigid material, about one-half the weight of aluminum, which may be machined, formed or welded. It is virtually impervious to corrosive gases and liquids, treated and untreated waters, alcohol, alkalies, strong and weak organic or inorganic acids. It has good impact strength and eliminates replacement problems. It is available in sheet, rod, pipe and block stock.

The limitations of Boltaron are few and deal chiefly with strength and temperature conditions. Trained engineers and fabricators throughout the United States and Canada stand ready to discuss Boltaron 6200 with you in relation to your specific problem. You have much to gain by writing now, Box 127, for further details along with the name of the Boltaron representative in your area.

H. N. HARTWELL & SON, INC.

Industrial Plastics Division, Park Square Bldg., Boston, Massachusetts
NEED EXTRA IMPACT STRENGTH? Ask about Boltaron 7200.

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For High Temperature - High Pressure Sealing

DURA SEAL TYPE P.T. is the engineered mechanical seal for meeting severe sealing conditions. Pressures from 50 psi to 1000 psi . . . temperatures from minus 80°F. to 450°F. For sealing all fluids except molten alkali metals and some fluorine compounds in the higher temperatures. For information on applications . . .

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DURAMETALLIC CORPORATION, Kalamazoo, Michigan

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Here's what experienced riggers say:

for safety's sake we use **Genuine CROSBY CLIPS**

LOOK FOR THE RED-U-BOLT

For absolute wire rope safety on the job, insist on CROSBY CLIPS to safeguard men and equipment. They're drop forged for maximum strength and hot-dip galvanized for extra durability.

CROSBY PRODUCTS DIVISION
AMERICAN HOIST AND DERRICK CO.
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DATA FILE

(Begins on page 220)

charts and tables on standard and special styles of sling chains and attachments, and their sizes, weights, and working load limits under many conditions. Columbus McKinnon Chain Corp.

434 **Pneumatic Tube System**—This booklet describes a prefabricated pneumatic tube system, suggests a variety of arrangements for installing the equipment in any type of building, and lists components furnished in the "kit." Also provides instructions for laying out and installing the double-tube system, including plan and side-view drawings. Lamson Corp.

435 **Lift Truck Work Kit** — A method of predetermining the time necessary for fork lift trucks to perform specific operations is provided in this work kit, designed to enable plant engineers to apply fork lift truck standard performance data. It can assist in determining efficiency of fork lift trucks now in use as well as in planning for future needs. Includes typical materials handling examples to show technique for application of the data, as well as charts providing times for basic truck motion elements. The Yale & Towne Mfg. Co.

436 **How to Pick a Truck** — Catalog 54, 8 pp, features a step-by-step procedure for making the best fork truck choice for a particular handing job. Other sections in the booklet show at a glance complete specifications on each of company's trucks, and illustrates important construction and design features. The Baker-Raulang Co.

437 **Increasing Warehouse Capacity** — How mass handling methods effected through the use of fork-lift trucks, increased a plant's warehouse capacity 300 per cent is told in Job Study 139. Photos show how trucks speed up loading operations. Towmotor Corp.

438 **Fork Truck Efficiency Test**—This 8-pp article explains how to tell when fork trucks need corrective measures. Lists equipment and facilities necessary for truck testing, tells how to test traveling efficiency and hoist speed measurements, shows suggested test data forms. Mercury Mfg. Co.

439 **Handling Baskets** — Bulletin B-54 describes company's complete line of standard and custom-engineered Eezy-Stak parts handling baskets, for machinery, washing, plating. Wire & Iron Products, Inc.

INSTRUMENTS, CONTROLS

440 **Control Centers**—Advantages of control centers and their versatility are discussed in this 28-pp booklet. Illustrated with photos and full-colored drawing, booklet shows 10 typical installations of control centers and explains how this equipment can lower costs. Design and construction features are explained, and three basic NEMA types of construction described. Electrical and mechanical construction details are shown, typical specifications provided. The Clark Controller Co.

441 **Orifice Meters**—Bulletin 1050 Rev. I, 28 pp, shows how manufacturer's orifice meters are made, how they operate. Tables give capacity data, and there are descriptions of manifold arrangements and differential ranges, along with illustration of various parts. Sketches show how meters are used. Rockwell Mfg. Co.

442 **For Industrial Metering**—Practical selection and application data on meters for industrial liquids are provided in 20-pp Form 566. Explains value of metering in batch mixing, process and cost control. Illustrated charts show how to select proper meter according to type, temperature and flow rate of liquid to be metered, and include specifications for models shown. Strainers, valves and other accessories are described. Neptune Meter Co.

443 **Zone Control Equipment**—Economical operation of the heating plant through use of a zone heating control system is the subject of illustrated 12-pp Apparatus Bulletin T-385. Describes a standard and clock model, discusses electronic principle of the control system, lists specifications. Schematic drawings point out applications, show dimensions of cabinets and of bulbs and accessories. Johnson Service Co.

NOW SPRAY YOUR RUST PREVENTIVE!

RUST VETO *quick and handy!*

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- Clear durable coating seals out moisture
- Dry film protects in storage and remains on metal in processing
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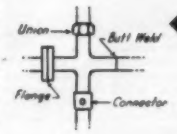
THE NEW STANDARD IN PIPELINE ECONOMY

Speedline® **STAINLESS STEEL FITTINGS SIMPLIFY PIPELINE DESIGN!**



FITTING IS ADAPTABLE . . . YOU SELECT THE TYPE OF JOINT

- Simple layouts require fewer design hours
- Versatility permits reduced inventory
- Expanding feature saves time, money . . . eliminates need for costly tools

Details of the greater design flexibility possible with Speedline Fittings—at lower cost—are contained in this new illustrated catalog. Write for a copy today. There's no obligation.

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Speedline® STAINLESS STEEL FITTINGS

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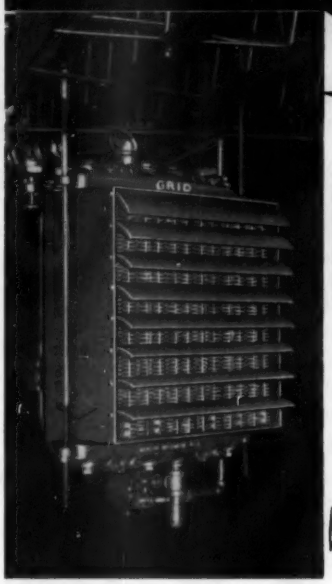
MAINTENANCE MEN in the NATION'S LEADING INDUSTRIES turn to GRID UNIT HEATERS For *Trouble-free heating service*



NO Maintenance or Repairs

hang 'em ...and forget 'em

Cost conscious maintenance men turn to GRID for relief from the continuous expense of heating failures experienced with ordinary unit heaters. GRID has served the nation's leading industries without maintenance or repair costs since 1929. GRID Unit Heaters installed in 1929 are still operating today . . . the only attention needed has been an occasional oiling of the motor. No other unit heater can approach this record. It is a record made possible because

GRID is an all cast unit finned hearing sections and headers tested to withstand steam pressures up to 250# P.S.I.

GRID construction uses no brazed, soldered, rolled or welded connections between condenser and headers. A specially designed threaded nipple assures a precision, leak-proof fit.

GRID construction has all similar metals in contact with steam, thus preventing electrolytic corrosion which eventually occurs in copper type unit heaters where steam passes from iron pipes into copper cores. (Write for booklet CORROSION IN UNIT HEATERS.)

GRID construction resists corrosion from fumes present in many plants.

GRID design incorporating low outlet temperatures, proper fan sizes and motor speeds, assures delivery of warm comfortable air in ample volume to the working level. No stratification of warm air at the ceiling to waste your fuel dollars.

Get the complete GRID story today. Write for catalog on GRID Unit Heaters. For GRID Blast Coils, write for Catalog BC-1049.

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Manufacturers Since 1883 • WAUSAU, WISCONSIN
REPRESENTATIVES IN ALL PRINCIPAL CITIES

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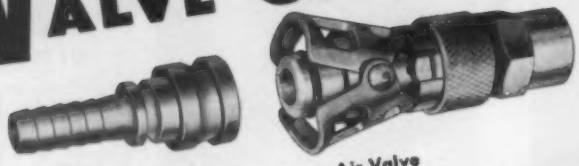
NEW DESIGN

Quick-As-Wink® VALVE COUPLINGS



✓ Combination of 3-way Sliding Sleeve Air Valve and Quickly Detachable Hose Coupling.
✓ Permits Operator to Turn Air "On"—or "Off"—right at the Tool.
✓ Exhausts Tools Automatically.
✓ Speeds up Tool Changes.
✓ Cannot be Disconnected while Air is On.
✓ Free Swiveling to Prevent Hose Kinking.
✓ Approved by Plant Safety Authorities.

Thousands in daily use. ¼" to ¾" sizes with hose or male or female pipe threads. Write for Bulletin No. 104-D. It gives full details.

Quick-As-Wink VALVE COUPLINGS

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DU PONT . . . *Opportunities for* MAINTENANCE ENGINEERS

A limited number of career openings are available to experienced graduate mechanical and industrial engineers in du Pont's centralized Engineering Department in Wilmington, Delaware. Successful applicants will provide consulting service and technical assistance to operating plants on problems in the broad field of engineered maintenance.

Specialized experience in one or more of the following areas is desired:

LABOR MEASUREMENT

Experience in and responsibility for the application of time data and measurement techniques to maintenance, construction, machine shop, and related fields.

CORRECTIVE MAINTENANCE

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DATA FILE

(Begins on page 220)

444 **Temperature Controls**—Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating, nonindicating controls; thermometers; bulb installation accessories; process timers, and gas pilots. Includes prices and references to detailed literature. The Partlow Corp.

445 **For Liquids Worth Storing**—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp.

446 **Wide Range Regulator**—Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.

447 **How to Weigh Tanks**—Bulletin 4106, 8 pp, explains how to weigh the contents of tanks, bins, and hoppers electronically with company's SF-4 load cells. Also covers installation design considerations such as mountings, temperature effects, corrosion protection, and vibrations. Diagrams and sketches accompany text. Baldwin-Lima-Hamilton Corp.

448 **Portable Brinnell Tester** — A precision instrument for making standard Brinnell hardness tests, which can be carried anywhere or used as a bench tester, is described in this bulletin. Brief text covers its operation, and photos show it in use on many jobs. Advantages of the instrument and its use in making tests are discussed. Andrew King.

MAINTENANCE

449 **Building Maintenance** — Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, roadpatching, roofing materials. Includes instruction for applying them. Flexrock Co.

450 **Proper Care of Floors** — Filled with what-to-use and how-to-use-it information, this 32-pp booklet is a well written, practical text on floors. Presents floor preservation as a triple process involving cleaning, sealing and maintaining. Discusses various floor surfaces and their special problems. Gives helpful hints on floor maintenance and provides a handy chart covering preparation procedures and products for 12 common floor surfaces, including cement, wood. West Disinfecting Co.

451 **Better Floor Care** — This illustrated folder describes products designed to aid efficient floor care. Lists combination scrubber-vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other mopping equipment. Included are waxes, sealers, and cleansers. Finnell Systems, Inc.

452 **Cleaning Problem Solutions**—Illustrated Bulletin 154, 12 pp, presents information on a wide range of cleaning methods and shows equipment available. Special emphasis is placed on the stationary vacuum cleaning system and its long-run economy in many installations. The Spencer Turbine Co.

453 **Insulation Coating** — This 32-pp illustrated handbook, Form L-17, presents the advantages of company's NoDrip insulation coating for preventing condensation drip from

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metal, concrete, brick, wood, plaster or composition surfaces. Lists applications and describes methods of applying. Contains tabulated data on quantity required to cover various size tanks and pipe and data on effect of different humidities. J. W. Mortell Co.

454 **Protective Paints** — Details on a rubber-base paint formulated to afford increased protection against corrosion from acids and alkalis and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for wood and metal. Cellulose Products Dept., Hercules Powder Co.

455 **Tar Base Coatings**—Now available is a collection of five bulletins on company's 100 series of cold applied tar base coatings. One bulletin gives general information on the full line and provides an application chart. The others give detailed specifications and application information on the various types. These include a coating for protection against severest corrosive conditions; a thin high gloss coating for general maintaining purposes; a coating for protection against generally severe corrosive conditions; and one for water tank interiors. Pittsburgh Coke & Chemical Co.

456 **Light Scaffolds** — This series of illustrated bulletins describes company's line of aluminum alloy Up-right scaffolds and accessories. Pictures one-piece sections and multi-section models with various ranges of adjustability. Points out such features as locking hooks which provide automatic security and locking casters for safety on stairways and inclines. Up-Right Scaffolds Div., Up-Right, Inc.

LUBRICANTS, LUBRICATION

458 **Bearing Lubrication**—Vol. XL, No. 10 of this company's Lubrication magazine provides an excellent 12-pp article on industrial bearing lubrication. Illustrated with photos and drawings, text covers such subjects as bearing design; bearing surfaces; bearing overhaul; aspects of lubrication, including factors involved in choice of turbine oils and diesel lubricants, and the effects of moisture; and the life expectancy of bearing lubricants. The Texas Co.

459 **Centralized Lubrication** — Pocket-sized 24-pp, Form 34-22, called "Ask Anyone in Industry" describes in comic-book form the hazards and inefficiency inherent in conventional lubrication practice and promotes use of centralized lubrication—in the form of Alemite Accumeter measuring fittings. Shows how these are connected by tubing to a lubrication pump controlled by a timer. Alemite Div., Stewart-Warner Corp.

460 **Automatic Lubrication** — Sixteen-pp Catalog L-52 describes force feed lubricators for all types of machinery. Illustrated, gives full design and construction details on company's open and enclosed type lubricators, available in capacities from 2 to 32 units, 1 to 24 feeds per minute. Hills-McCanna Co.

461 **Force Lubricators** — Twelve-pp Catalog 25 G describes and pictures company's new Model 25 lubricator, a popular priced, general purpose unit adaptable to many applications. Lists machines for which it provides economical, automatic lubrication. Manzel Div., Frontier Industries, Inc.

462 **Lubrication Wall Chart**—This handy wall chart contains lubrication recommendations for many industrial needs. Covers such applications as hydraulic systems, spindles, air compressors, reduction gears, electric motors, others. It is printed on tough varnished stock. E. F. Houghton & Co.

WATER CONDITIONING

464 **Testing Equipment**—Designed for use as a guide in the selection of water testing equipment, this 12-pp bulletin describes complete line of titration stands and tests for hardness, alkalinity, chloride, sulfide, etc.; cabinets and test set for similar tests; Conducto Bridge for determination of specific conductance of water solutions, colorimetric comparators; and the photometer. W. H. & L. D. Betz.

465 **Handbook on Demineralizing**—Comprehensive 40-pp Bulletin 5800-B compares various methods of water treatment, indicating the comparison between demineralizers and evaporators. It discusses the characteristics of the various types of available cation and anion exchange materials and offers data on operating costs of demineralizing. It tells when to use 2-bed, 3-bed, 4-bed, mixed or mono-bed demineralizers. It also indicates when decarbonators or vacuum deaerators are required. The bulletin is replete with typical flow diagrams, photos of installations. Cochrane Corp.

466 **Boiler Water Treatment**—A complete system of boiler water conditioning is discussed in this illustrated 12-pp bulletin. Stresses need for purifying boiler water to render it suitable for use in a steam plant, so as to cut down boiler repairs and replacements, heat transfer losses, shutdowns. Describes company's three-fold program of survey, treatment and control. E. F. Drew & Co., Inc.

467 **Information on Ion Exchangers**—Here are three booklets on ion exchangers; Nalcite HCR, a styrene type cation exchanger; Nalcite SAR, a basic anion type; and Super Nalcolite, a synthetic gel type zeolite for cation exchange. Tables and graphs explain performance of these water treating resins under various operating conditions. Physical characteristics, exchange capacities, regeneration techniques given. National Aluminate Corp.

OTHER EQUIPMENT

468 **Protective Lining** — T-Lock Amer-Plate, a protective lining for concrete pipe and structures, is described as to properties and uses in this 8-pp folder. Photos show production of this acid-resisting sheet from synthetic resins, pigments and plasticizers. Other photos show some installations. A table shows sheet sizes for both the ¼ and full lining of

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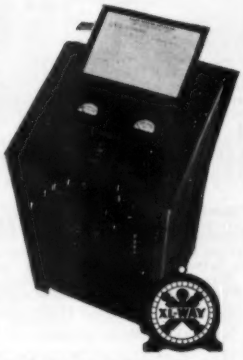

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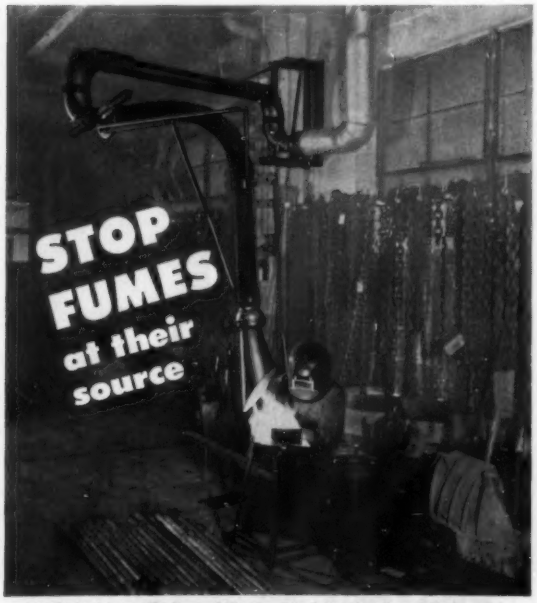

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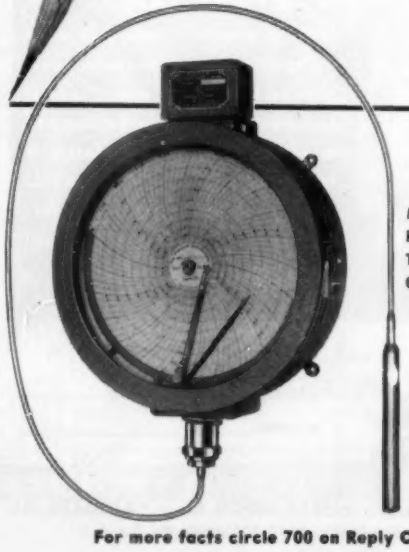

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(Begins on page 220)

pipe diameters from 30 to 72 in. Amercoat Div., American Pipe and Construction Co.

469 **Finishing Systems**—Illustrated Catalog A-653, 12 pp, describes complete finishing systems for porcelain and synthetic enamel, lacquer, paint, and other finishing. Also covers a variety of other industrial equipment including ovens, dust collectors. The R. C. Mahon Co.

470 **Rigid Plastic Material**—The advantages, uses and available forms of Bolatron 6200 are presented in this catalog, about 14 pp. Gives dimensional data, tolerances, weights for sheet, bar stock, pipe, fittings and valves made of this unplasticized polyvinyl chloride. Includes thermal, electrical and mechanical properties, also detailed information on chemical resistance. H. N. Hartwell & Son, Inc.

471 **Metal Quenching**—Valuable information on the quenching of metals is available in this 24-pp booklet. It is illustrated with charts and graphs depicting cooling curves, cooling rates, effect of bath temperatures, agitation curves, hardness penetration curves, and transformation diagrams. Contains a series of typical case studies which detail the solution to some tough quenching problems. Gulf Oil Corp.

472 **Blast Cleaners, Dust Collectors**—Eight-pp Bulletin 100-A covers company's blast cleaning machines, dust filters, and welding fume collectors. Describes direct pressure generators, abrasive blast cabinets, blast cleaning rooms and elevators, welding fume collectors and others. Ruemelin Mfg. Co.

473 **Fire Hose Reels** — Sixteen-pp Catalog H-511-F describes hose reels for fire fighting equipment, with illustrations of various models and cutaway view showing component features. Specifications, as well as descriptions of operational advantages are included. Clifford B. Hannay & Son, Inc.

474 **Magnetic Selection Guide** — Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lighting magnets, serves as handy guide to the selection of magnets. Dings Magnetic Separator Co.

475 **To Keep Wire Rope at Work**—Form 3547 is an 82-pp handbook titled: "Here's How to Keep Your Wire Rope Working," and is filled with practical tips on care and use of wire rope. Tells how wire rope is constructed, what types are suited to various jobs, how to install it. Covers such subjects as abrasion, lubrication, avoiding kinks, alignment of sheaves, winding on drums, bending fatigue, wire breaks, when to discard a wire rope. Wire Rope Div., American Chain & Cable Co., Inc.

476 **Precision in Packaging**—The advantages of automatic machine packaging are outlined in this illustrated 24-pp bulletin. Describes various packaging and sealing machines, indicates kinds of packaging machinery now being produced. Illustrates various folding carton styles. Robert Gair Co., Inc.

477 **Filters, Strainers** — Industrial Catalog 1054, 48 pp, provides application and engineering information on company's line of micronic filters and precision strainers. Fuel filters, full-flow and by-pass lube filters, air separators, and metal edge strainers for fuel lube and industrial use are presented along with construction details, performance data, and specifications. Purolator Products, Inc.

478 **Steam Accumulator** — How the steam supply and demand can be balanced by means of company's steam accumulator is told in Bulletin RA-52-8. Stresses reduced boiler capacity required and increased boiler efficiency afforded by use of the accumulator, other advantages. Foster Wheeler Corp.

479 **Self-Lubricating Bushings** — Eight-pp Bulletin Form 112 discusses company's Graphalloy bushings, designed for strength and high heat dissipating qualities. Also discusses such advantages as durability, no fumes, low and high temperature operation, fire preventive and low coefficient of expansion. Presents engineering data. Graphite Metallizing Corp.

480 **Self-Locking Nuts** — This folder describes Flexloc self-locking nuts; shows how the locking action of the one-piece all-metal nut can be used either as locknut or stop nut. Applications of the nut are illustrated in small drawings. Standard Pressed Steel Co.

482 **Preheating Combustion Air**—This well-illustrated 36-pp booklet explains fuel savings and increased performance made possible by using waste heat in flue gases to preheat incoming combustion air. Also covers increased boiler output, ability to use lower grade fuels. Air Preheater Corp.

483 **Physical Properties of Synthetic Organic Chemicals**—In 24 pages, booklet F-6136 presents the latest data on more than 350 organic chemicals. It features 46 new products available from this company. For easy reference, chemicals are arranged by family groups with condensed application data. Physical properties are given. Carbide and Carbon Chemicals Co., Union Carbide and Carbon Corp.

484 **Effective Iron Removal**—This illustrated bulletin describes a closed pressure, non-chemical, single pumping iron removal filtration system for eliminating rusty water problems. Tells how the system works, shows application in one typical plant. A diagrammatic drawing showing component parts is included, and chief advantages are listed. Aquatrol Ferr-X Corp.

486 **Cupro Nickel Alloys**—The use of cupro-nickel alloys for heat exchanger tubes in power service, due to their resistance to attack by salt water used for cooling and their superior strength at elevated temperatures, is discussed in this 12-pp bulletin. Provides tabulated data on performance in specific service in various industrial fluids such as ammoniacal solutions, brines, alkaline solutions, petroleum products, organic compounds, others. The International Nickel Co., Inc.

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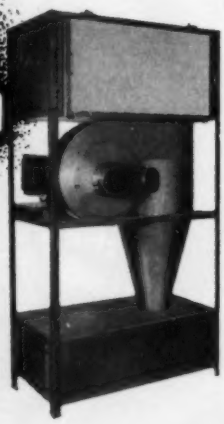

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Agency—Batten, Barton, Durstine & Osborn, Inc.

DU PONT DE NEMOURS & CO., E. I. 240
Agency—Deutsch & Shea

DURAMETALLIC CORPORATION 238
Agency—Ogden Advertising

ELECTRIC CONTROLLER & MFG. CO. 12-13
Agency—Penn & Hamaker, Inc.

EXCEL ELECTRIC SERVICE CO. 243
Agency—Edgar Walter Fischer

EXIDE INDUSTRIAL DIVISION ELECTRIC STORAGE BATTERY CO. 146
Agency—Geare-Marston, Inc.

FAULTLESS CASTER CORPORATION 186
Agency—Perrin-Paus Company

FEEDRAIL CORPORATION 213
Agency—Peterson & Kempner, Inc.

FILON PLASTICS CORP. 20
Agency—Len Woolf Co.

FINNELL SYSTEM, INC. 14
Agency—Johnson, Read & Co.

FIRESTONE PLASTICS COMPANY 11
Agency—Grey Advertising Agency, Inc.

FLEXROCK COMPANY 242
Agency—Walter S. Chittick Company

FOSTER COMPANY, L. B. 224
Agency—Lando Adv. Agency

FOSTER WHEELER CORPORATION 24-25, 151
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

FULLER COMPANY 227
Agency—O. S. Tyson & Company, Inc.

GAIR CO., INC., ROBERT 66
Agency—James Thomas Chirurg Co.

GATES RUBBER COMPANY, THE 10
Agency—Harold Walter Clark, Inc.

GENERAL CABLE CORPORATION 175
Agency—Hicks & Greist, Inc.

GENERAL ELECTRIC COMPANY APPARATUS DIVISION ..... 33 thru 36, 77
Agency—G. M. Basford Company

GENERAL ELECTRIC COMPANY LAMP DIVISION 209
Agency—Batten, Barton, Durstine & Osborn, Inc.

GOLDEN-ANDERSON VALVE SPECIALTY CO. 247
Agency—Walker & Downing

GOODRICH COMPANY, THE B. F. 17
Agency—The Griswold-Eshleman Co.

GOULD-NATIONAL BATTERIES, INC. 72
Agency—Hutchins Adv. Company, Inc.

GRAPHITE METALLIZING CORP. 222
Agency—The Kotula Company

GR PRODUCTS, INC. 218, 222, 228
Agency—Norman-Navan, Inc.

GULF OIL CORPORATION 18-19
Agency—Young & Rubicam, Inc.

GUSTIN-BACON MFG. COMPANY 15
Agency—Valentine-Radford, Advertising

HANNAY & SONS, INC., CLIFFORD B. 234
Agency—Renner Advertisers

HARTWELL & SON, INC., H. B. 237
Agency—H. B. Humphrey, Alley & Richards, Inc.

HARTZELL PROPELLER FAN CO. 248
Agency—Kight Advertising, Inc.

HEINEMANN ELECTRIC COMPANY 184
Agency—Thomas R. Sundheim, Adv.

HERCULES POWDER COMPANY 223
Agency—Fuller & Smith & Ross, Inc.

HERTNER ELECTRIC COMPANY 228
Agency—Meermans, Inc.

HILLS-McCANNA COMPANY 178
Agency—Russell T. Gray, Inc.

HORN COMPANY, INC., A. C. 129
Agency—G. M. Basford Company

HOUGHTON & CO., E. F. 239
Agency—Beaumont, Heller & Sperling, Inc.

HOWELL ELECTRIC MOTORS CO. 206
Agency—The Jaqua Company

HUNT & SON, INC., C. B. 240
Agency—Henry T. Bourne Adv. Agency

INTERNATIONAL NICKEL CO., INC. 78
Agency—Marschalk & Pratt Co., Inc., Div. of McCann-Erickson, Inc.

INVINCIBLE VACUUM CLEANER MFG. CO. 187
Agency—The Bayless-Kerr Company

JOHNS-MANVILLE 142
Agency—J. Walter Thompson Co.

JOHNSON SERVICE COMPANY 49
Agency—K. E. Shepard, Inc.

JONES & LAUGHLIN STEEL CORP. 68
Agency—Ketchum, MacLeod & Grove, Inc.

JOY MANUFACTURING COMPANY 23
Agency—Walker & Downing

KELLER TOOL DIVISION GARDNER-DENVER CO. 235
Agency—The Fensholt Adv. Agency, Inc.

KING, ANDREW 237
Agency—John B. Ferguson, Jr.

KORFUND COMPANY, INC., THE 204
Agency—Sanger-Funnell, Inc.

LAMSON CORPORATION 168
Agency—Chapman-Nowak & Associates, Inc.

LELAND ELECTRIC COMPANY 197
Agency—Fletcher D. Richards, Inc.

LE ROI DIVISION WESTINGHOUSE AIR BRAKE CO. 139
Agency—Hoffman & York, Inc.

LINK-BELT COMPANY 82
Agency—Klau-Van Pietersom Dunlap, Inc.

LIQUIDOMETER CORP., THE 235
Agency—Lucerna Company, Inc.

LYON METAL PRODUCTS, INC. 5
Agency—Reincke, Meyer & Finn, Inc.

MAGLINE, INC. 27
Agency—Rossi & Company

MAHON COMPANY, THE R. C. 183
Agency—Anderson, Inc.

MANHEIM MFG. & BELTING CO. 179
Agency—Foltz-Wessinger, Inc.

MANNING, MAXWELL & MOORE, INC. 226
Agency—Fuller & Smith & Ross, Inc.

MANZEL 188
Agency—Baldwin, Bowers & Strachan, Inc.

MARK & COMPANY, CLAYTON 234
Agency—Martin-Engel & Associates

MASTER BUILDERS COMPANY 208
Agency—The Bayless-Kerr Co.

MERCURY MFG. COMPANY 176
Agency—O'Grady-Andersen-Gray, Inc.

MICRO-SWITCH 125
Agency—Reincke, Meyer & Finn, Inc.

MINNESOTA MINING & MFG. CO. 147
Agency—Batten, Barton, Durstine & Osborn, Inc.

MISSISSIPPI GLASS COMPANY 169
Agency—Ralph W. Smith Adv. Agency

MODINE MFG. COMPANY 63
Agency—Klau-Van Pietersom-Dunlap, Inc.

MORTELL COMPANY, J. W. 244
Agency—Ross Roy, Inc.

MURRAY MFG. CO., D. J. 239
Agency—R. C. Breth, Inc.

NATIONAL ALUMINITE CORP. 79
Agency—Armstrong Advertising Agency

NATIONAL DUST COLLECTOR CORP. 48
Agency—Russell T. Gray, Inc.

NATIONAL ELECTRIC PRODUCTS CORP. 203
Agency—Ketchum, MacLeod & Grove, Inc.

NEPTUNE METER COMPANY 158
Agency—W. L. Towne, Advertising

NEWCOMB-DETROIT COMPANY 241
Agency—Gray & Kilgore, Inc.

NEW YORK AIR BRAKE CO. 16
Agency—Humbert & Jones Adv.

NEW YORK BLOWER CO. 233
Agency—C. Lynn Coy

NICHOLSON & COMPANY, W. H. 81
Agency—The Aitkin-Kynett Co.

NORGREN COMPANY, C. A. 170
Agency—Walter L. Schump, Advertising

OHIO INJECTOR COMPANY 74
Agency—Fuller & Smith & Ross, Inc.

ORR & SEMBOWER, INC. 131
Agency—Beaumont, Heller & Sperling, Inc.

OTIS ELEVATOR COMPANY 6-7
Agency—G. M. Basford Company

OWENS-ILLINOIS 133
Agency—J. Walter Thompson Co.

PANGBORN CORPORATION 60
Agency—VanSant, Dugdale & Co., Inc.

PARTLOW CORPORATION 243
Agency—Moser & Cotins, Inc.

PEERLESS PUMP DIVISION FOOD MACHINERY & CHEMICAL CORP. 26
Agency—The McCarty Company

PITTSBURGH COKE & CHEMICAL CO. 135
Agency—Walker & Downing

PITTSBURGH CORNING CORPORATION 55, 144
Agency—Ketchum, MacLeod & Grove, Inc.

PITTSBURGH PLATE GLASS CO. 245
Agency—VanSant, Dugdale & Co., Inc.

POLYMER CORP. OF PA. 64
Agency—Beaumont, Heller & Sperling, Inc.

POTTS COMPANY, HORACE G. SPEEDLINE STAINLESS STEEL FITTINGS DIV. 239
Agency—The Roland G. E. Ullman Org., Inc.

POWERS REGULATOR CO., THE 242
Agency—Symonds, MacKenzie & Co., Inc.

PUROLATOR PRODUCTS, INC. 157
Agency—G. M. Basford Co.

RADIATOR SPECIALTY CO. 222
Agency—Bennett-Evans Company

RADIO CORPORATION OF AMERICA 166
Agency—Al Paul Lefton Co.

RAYNOR MFG. COMPANY 241
Agency—Shoaf & Shoaf Adv.

REEVES PULLEY COMPANY 230
Agency—Caldwell, Larkin & Sidener-Van Riper, Inc.

RESOLITE CORPORATION 194
Agency—Dan W. Frye, Adv.

RICHARDS-WILCOX MFG. CO. 180
Agency—George H. Hartman Co.

ROBERTSON COMPANY, H. H. 201
Agency—Bond & Starr, Inc.

ROCKWELL COMPANY, W. S. 162
Agency—Spooner & Kriegel

ROCKWELL MANUFACTURING COMPANY 159
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

ROHM & HAAS CO. 45
Agency—Arndt-Preston-Chapin-Lamb & Keen, Inc.

ROME CABLE CORPORATION 211
Agency—Charles L. Rumrill & Co., Inc.

RUEMELIN MANUFACTURING CO. 243
Agency—Paulson-Gerlach & Associates Inc.

SARCO COMPANY, INC. 47
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

SCOTT PAPER COMPANY 185
Agency—J. Walter Thompson Co.

SEXAUER MFG. CO., J. A. 218
Agency—Lawrence Peskin, Incorporated

SLY MFG. COMPANY, W. W. 212
Agency—Bayless-Kerr Co.

SOCONY MOBIL OIL CO., INC. 8-9
Agency—Compton Advertising, Inc.

SPEEDLINE STAINLESS STEEL FITTINGS DIV. HORACE T. POTTS COMPANY 239
Agency—The Roland G. E. Ullman Org., Inc.

SPENCER TURBINE CO., THE 245
Agency—W. L. Towne Advertising Counselor

SQUARE D COMPANY 41
Agency—Reincke, Meyer & Finn, Inc.

STANDARD OIL CO. (INDIANA) 57
Agency—D'Arcy Advertising Company

STANDARD PRESSED STEEL CO. 165
Agency—Gray & Rogers

SUN OIL COMPANY 43
Agency—Ruthrauff & Ryan, Inc.

SYLVANIA ELECTRIC PRODUCTS, INC. 200
Agency—J. Walter Thompson Co.

TEXAS COMPANY, THE ..... Second Cover
Agency—Erwin, Wasey & Co., Inc.

THOMAS FLEXIBLE COUPLING CO 4
Agency—Reinhold C. Ferster Adv.

TOWMOTOR CORPORATION 182
Agency—Howard Swink Adv. Agency, Inc.

UNITED STATES ELECTRICAL MOTORS, INC. 127
Agency—The McCarty Company

UNITED STATES RUBBER CO. 51, 205
Agency—Fletcher D. Richards, Inc.

"UP-RIGHT" SCAFFOLDS 189
Agency—Norton M. Jacobs Adv. Agency

VIKING PUMP CO. 208
Agency—J. M. Hickerson, Inc.

WALWORTH 177
Agency—G. M. Basford Company

WARREN STEAM PUMP CO., INC. 156
Agency—The Davis Press, Inc.

WARREN WEBSTER & CO. 219
Agency—William Jenkins, Adv.

WAYNE MFG. COMPANY 198
Agency—H. M. Gardner & Associates

WAYNE PUMP COMPANY 153
Agency—A. E. Aldridge Associates

WEST DISINFECTING COMPANY 145
Agency—G. M. Basford Company

WESTINGHOUSE ELECTRIC CORP. LAMP DIVISION 30-31
Agency—McCann-Erickson, Inc.

WHITING CORPORATION 214
Agency—Waldie & Briggs, Inc.

WHITNEY BLAKE COMPANY 241
Agency—J. Roy McLennan

WICKWIRE SPENCER STEEL DIV. OF CF&I 137, 210
Agency—Doyle, Kitchen & McCormick, Inc.

WIEGAND CO., EDWIN L. 224
Agency—Ketchum, MacLeod & Grove, Inc.

WIRE & IRON PRODUCTS CO., INC. 233
Agency—Rossi & Company

YALE & TOWNE MFG. CO. 195
Agency—Ruthrauff & Ryan, Inc.

YARNALL-WARING COMPANY 61
Agency—The Michener Company

ZINK COMPANY, JOHN 231
Agency—Watts, Payne Adv., Inc.

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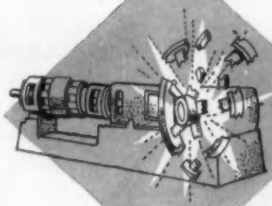

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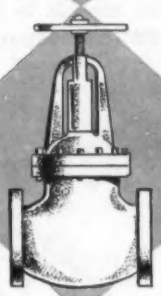

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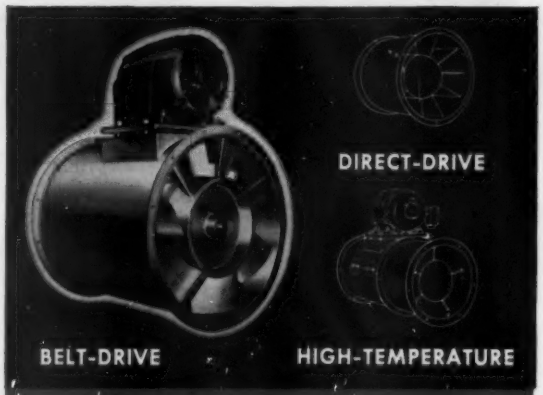

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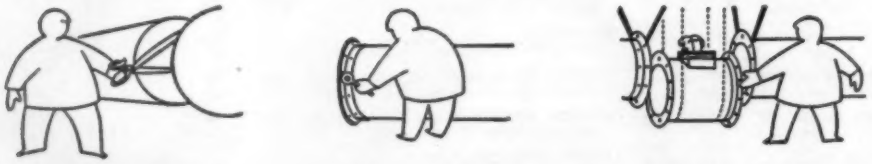

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Bolt angle-iron flanges to duct ends.

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And that's all—just make electrical connections and you're done.

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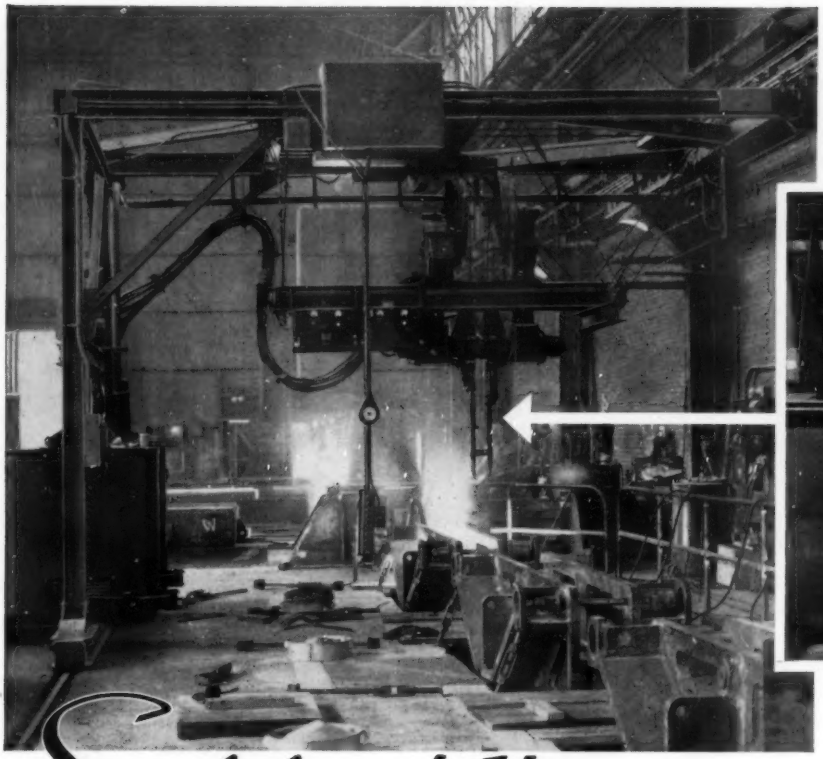
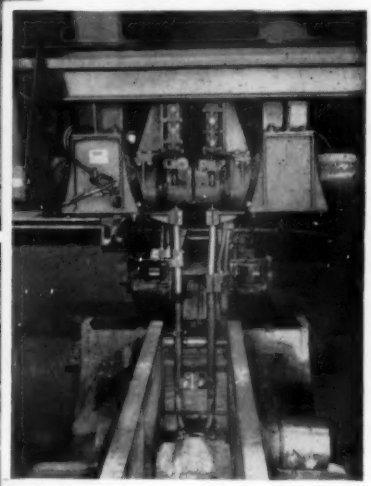


Left — This welding gantry in a prominent steel mill is the first application of the new Cleveland Tramrail stabilized hoist principle for welding purposes.

Below — The welding heads supported by the stabilized hoist, travel without sway or vibration and automatically apply a straight continuous and accurate welding bead.



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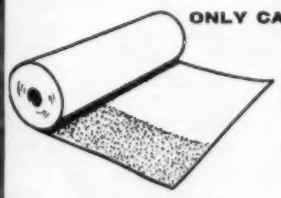

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IN THIS ISSUE

Simplified Maintenance Standards 87
From Dirty Air to "Country Air" at Plymouth Plant 92
How Safe Are Third Rail Systems? 94
High Capacity Air Conveying 98
Small Plant Hires Electronic Clerks 100
Lubrication of Ball Bearings 104
Gas Scrubbers—Fit Material to the Service 106
Rehabilitating Flood-Damaged Plant Equipment 108
How Aluminum Can Serve Industry 110
Electronics Control Painting 112
Maintenance Problems—How to Study Them, Get the Facts and Find the Solution 114
Big Squirt Cuts Metal 116
How to Care for Your Floors 117
Plastics Problems Pester Plant Engineers 118
Training Center at "The Mill" 124
Isotopes Prove Rust Preventives Really Penetrate 126
Protective Coating Stops Corrosion, Abrasion 128
Maintenance Study Can Be Profitable 129
Industrial Landscaping 132
How Shakeproof Solved Landscaping Problems 133
New Developments and Applications 134
Fuel Change Cuts Costs 136
Mobile Command Post at Eastman 137
32nd Plant Engineers' Society Organized 138

REGULAR DEPARTMENTS

'Round About with the Editors 2
Bulletins and Catalogs 23
Backtalk About Our Past Issues 30
Plant Engineers' Digest 34
Operation and Production 52
Construction Briefs 77
News from the Plants 140
New Plant Construction 146
New Products and Processes 152
Review of New Books 222
Data File of Commercial Literature 240
Advertisers' Index 266

Volume 9, No. 10 Circulation of this issue 45,560

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